THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS REVIEW, COPPER AND BRASS

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THE ADVANCE OF ALUMINUM IN THE FOUNDRY

WITH ILLUSTRATIONS OF ONE OF THE PRINCIPAL ALUMINUM CASTING WORKS IN THE UNITED KINGDOM.

As several articles have appeared in "The Metal Industry" illustrative of American foundry practice, it may prove interesting to some of our readers to know how foundries are run in Great Britain. The foundry here described is one of the oldest as well as the largest in England, and its practice as told below may be taken as typical of the present English foundry. —Ed.

Although aluminum is the chief component of all clays, and a constituent of many rocks, it was not until about 1827 that the metal was obtained in an isolated form, from this time many scientists adopted improved methods, but it was 1887 when a process was discovered that allowed the manufacture by electrolysis that it became a common metal; even then and for about a decade afterwards aluminum was regarded more or less as a scientific curiosity. Recently, however, it has found its way in a marvelous manner into a very large number of industries to many of which it is absolutely essential.

FIG. 1. EXTERIOR VIEW OF THE CAMBRIDGE STREET PLANT OF THE BIRMINGHAM ALUMINUM CASTINGS COMPANY.

About nine years ago the world's output did not exceed 9,000 tons per annum, and it is a question whether the supply did not exceed the demand. About this time came the motor car, the advent of which was destined to carry aluminum to the front as a metal where lightness was the all-important factor.

It is well known that coach builders and engineers

created such a demand for the metal that in a short time manufacturers, who for months previously had held an overwhelming stock, were at their wits' end to keep pace with the enormous demand. In the year 1910 the world's output had risen to 34,000 tons and the price had gone down to about one-half in the space of about 15 years. Now that the metal had become a commercial proposition it was for manufacturers generally to educate consumers, and this they have done far beyond all expectations.

In foreign countries the trade in aluminum cooking utensils has become something enormous, and Germany (although little aluminum is made in the country) probably holds pride of place in the production of these articles, importing practically all the metal she requires. England (characteristically) was content for a long time to send metal rather than create the new industries at home. Happily this is not so now, and many large firms are now competing successfully for home and colonial trade in this respect.

France, owing chiefly to the motor industry, takes a very large quantity of metal. Moreover, since the reduction of prices aluminum has been adopted by the motor trade generally, and is now a common necessity in this business. With the exception of the United States of America the United Kingdom takes probably the greatest percentage of the world's output, and it is really surprising the large number of trades that have found this practically "new" metal of such value in its adoption. The advantages of using aluminum in the case of castings for mechanically driven vehicles is so marked that be the price high or low little else is used; in fact, it is difficult to imagine what these vehicles would be like without aluminum, the saving in weight and cost being so very considerable. Difficulties which for a long time stood in the way of this valuable metal becoming a commercial success are gradually but surely disappearing, and now that we are on the high road of having perfect aluminum solders and process for nickeling the metal, it is difficult to see to what uses aluminum cannot be put. The results that have been obtained by careful study and attention, especially in the art of casting aluminum, are worthy of note, and it is in this department that the English patternmaker and molder excel.

FIG. 2. NO. 4 FOUNDRY FOR ALUMINUM CASTINGS.

By the courtesy of some of the leading firms in the United Kingdom we are enabled to illustrate the latest methods and specimens of high-class productions such as are demanded at the present day. Although most of the large manufacturing centers have their aluminum foundries, there is little doubt that the Midlands holds the sway in regard to the capacity of output. The probable reason of this is the fact that the aluminum business is so closely allied to that of the brass foundry, of which trade the Midlands is practically the home, and with the motor trade following in the wake of the cycle boom in the district the aluminum industry has made rapid strides.

The Birmingham Aluminum Castings Co. (1903 Ltd.) favor us with the first series of photographs, and by permission of F. W. Gower, Esq., managing director of this firm, we are enabled to give details of the methods

adopted by this well-governed and flourishing company. Starting in the early part of 1903 on quite a modest scale, they made castings for the automobile trade, which was then only just commencing the manufacture of motor cars on a commercial scale in this country. By the end of that year we believe we are correct in saying that not more than 50 men were employed, but since then it has been one continual question of expansion, and the number of work people has increased to over 500, the works covering acres of ground.

Ever since its inception the Birmingham Aluminum Castings Co., Ltd., has conducted its business on the best and soundest lines. They have spared neither time nor expense in improving their alloys, all of which are made on the premises, and the results now obtained as regards tensile strength and elongation are sufficient testimony

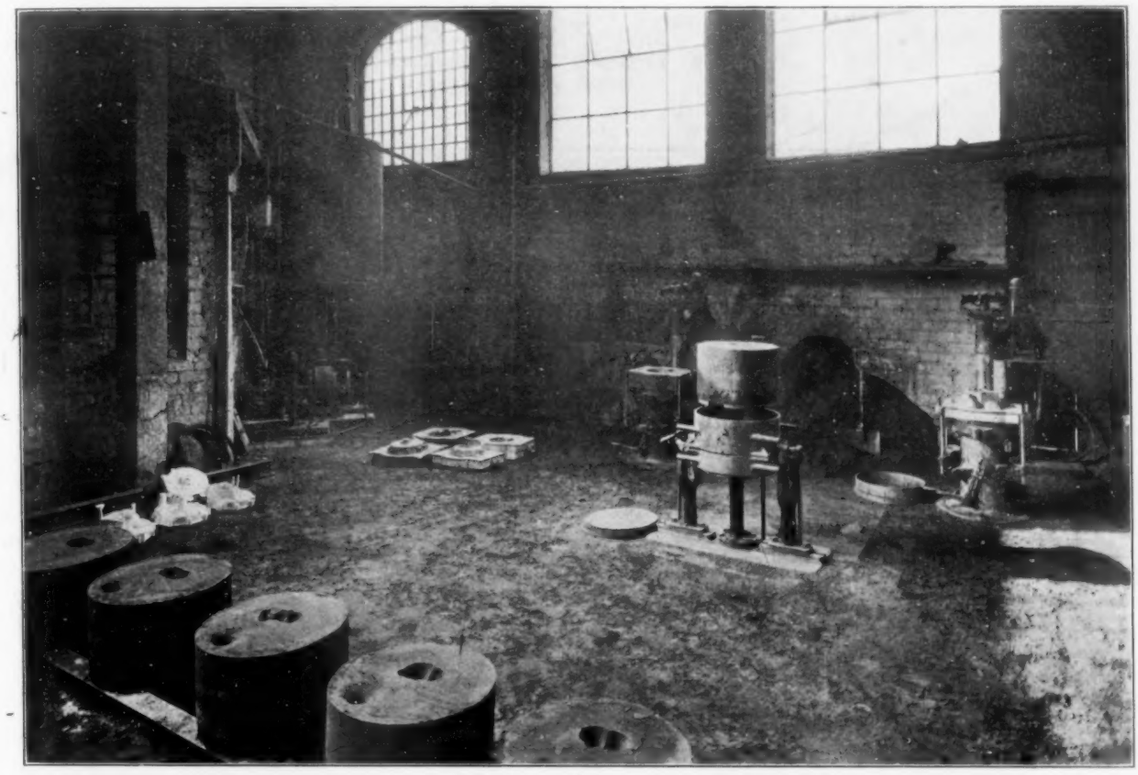


FIG. 3. HYDRAULIC MOLDING MACHINES IN THE NO. 4 FOUNDRY, INSTALLED BY P. H. BONVILLAIN AND E. RECONCERAY, PARIS, FRANCE.

FIG. 4. ADAPTABLE AND ADJUSTABLE MOLDING MACHINES SET IN PAIRS IN NO. 5 FOUNDRY.

of the strides which have been made in this direction, and the aluminum casting industry generally has benefited by the practical proofs this company has given as to the good results that can be obtained from a really first-class alloy.

For the mixing of alloys there is a separate department under the watchful eye of the management so that consistent results can be guaranteed. It is impossible to give satisfaction if large quantities of remelted scrap are used in the manufacture of aluminum castings, except in articles of a passive nature. A special feature is made of No. 6B. alloy, which contains no less than 90 per cent. pure aluminum, and combines the minimum specific gravity with the maximum tensile strength and elongation, but any alloy can be made to customers' requirements.

Patterns are made on the premises in mahogany, white wood or metal, and an efficient system of booking patterns in and out of stores and foundry is adopted. When not in use they are carefully stored. All customers' patterns are insured against fire.

No. 1 foundry is a lofty and well ventilated shop, lighted by electric arc lamps, with a four ton Tangy traveling crane running the full length of the building. Fig. 2.—Shows No. 4 foundry, a very large well lighted and ventilated shop, fitted with every appliance useful to the molder. Fig. 3 shows large hydraulic molding machines by Ph. Bonvillain and E. Ronceray, and several smaller type machines are in use here. No. 5 foundry is probably the largest, and being a recent addition, is fitted on most up-to-date lines. A five-ton traveling crane runs down the center of the building for dealing with the heavier work. About 30 "Adaptable" molding machines are placed at convenient distances along both sides. The "Adjustable" molding machines are also in use in this department, and both of these wonderfully accurate machines are a great boon to the molder. They take up little room, and are easily moved from one heap of sand to another. Fig. 4 shows the arrangement of these machines in pairs. At the near end is a battery of six high pressure gas furnaces, Fig. 5.

This firm claims to be the pioneers of the use of high pressure gas on a large scale as a reducing agency. The furnaces were designed and built by their own engineers, with the valuable assistance of Mr. A. W. Smith, B.Sc., now high pressure gas expert to the Birmingham Corporation. The chief advantages of the high pressure gas furnace are freedom from oxidization, very little radiation, the heat can be easily controlled, pyrometers being used to ascertain the correct temperature. There being no stoking a large amount of labor is saved, and as there are no ashes and dirt to be carted away a great saving is effected, and these items are a big consideration for a company so situated in the center of a city. Moreover, the cost of fuel is much lower than coke. The picture also shows a large core oven also heated by high pressure gas. At the far end are six coke furnaces and an experimental oil furnace. The whole of the furnaces are continually in use, and each heat is about one hundredweight. The gas furnace heats are through in about 18 minutes, while the coke heats take a little longer.

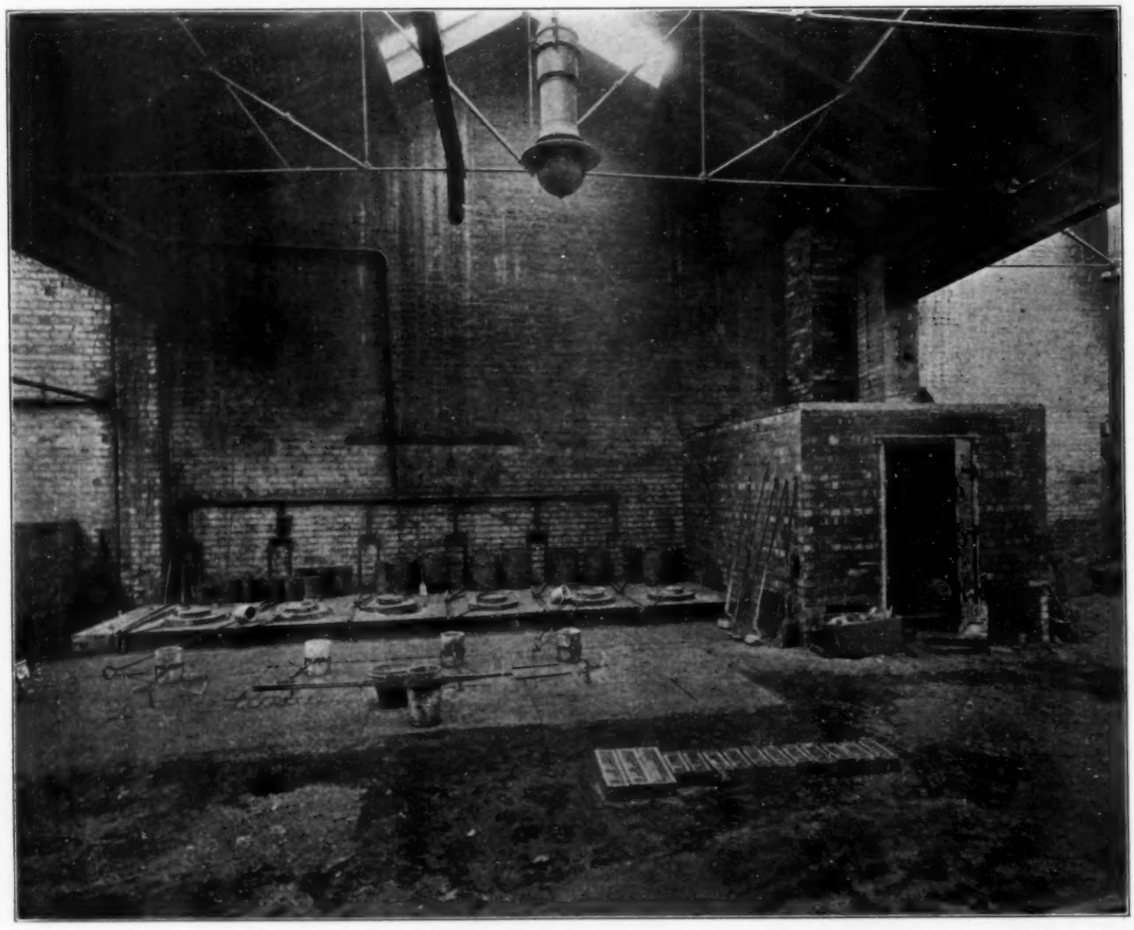


FIG. 5. BATTERY OF SIX HIGH PRESSURE GAS MELTING FURNACES, AND CORE OVEN ADJOINING.

From the foundry we move to the fettling shops on the second floor. Large, well ventilated and well lighted workshops are fitted with every labor-saving appliance for fettling the castings, circular saws, vertical and horizontal bandsaws, grinding machines, etc. When the castings leave these shops they are conveyed by an electric lift to the despatch department. A well equipped machine shop enables the firm to undertake the machining, sand-blasting or polishing of customers' castings. Fig. 6 shows a perfect casting for six-cylinder motor engine, a specimen of which any foundry might be proud. Measurement over all, 72 inches by 24 inches. In traveling through the various shops under the guidance of the works manager, Mr. H. J. Owen, one could not help noticing the precision and skill exhibited by the molders, and the interest they seemed to take in their work; a sure sign that the workers and management are in unity, without which few concerns can successfully exist.

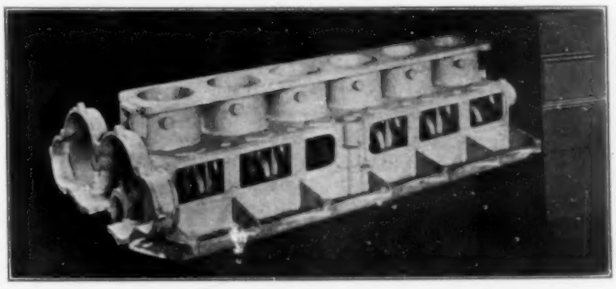


FIG. 6. A SIX-CYLINDER MOTOR ENGINE CASTING.

THE USE OF MEASURING INSTRUMENTS IN ELECTRO-PLATING

By H. J. Ter Doest.

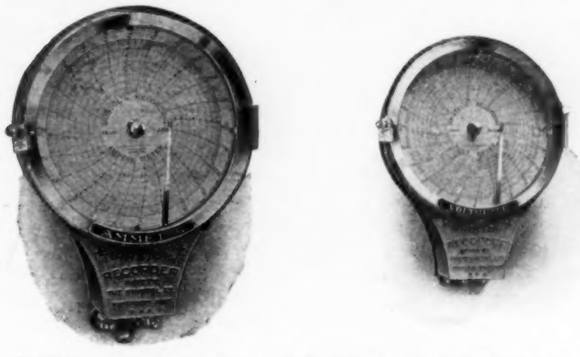
The uses volt and ampere-meters can be put to in plating operations are so many that it may interest some readers. A few are enumerated here, with directions for wiring them on two and three-wire circuits. To wire a volt-meter on a two-wire circuit, it is only necessary to place the instrument where it can be conveniently read from any tank, and then connect the positive wire direct to the positive lead of the dynamo. Now place a two-point battery switch at each tank from which it is desired to take a reading. Connect one end of the negative wire to the volt-meters run in

SANGAMO AMPERE HOUR METER. MADE BY SANGAMO ELECTRIC COMPANY, SPRINGFIELD, ILL.

series through all the switches, and connect the other end to the negative lead of the dynamo. It will now show the voltage the dynamo is generating if all the switches are closed. Next run a wire from the negative terminal (or work rod) of the tank to the other point of switch, and by putting the switch on this point you will get a reading on this tank, providing the tank is full of work and the rheostat switched on.

Thus you are enabled to obtain a dynamo and a tank reading by simply moving your switch to the right or left of contact points. This gives you an internal and external voltage reading and enables the operator to determine the exact internal resistance of each bath.

Now, if you place your switch on the positive contact, so that the current remains in circuit for the other tanks, in like manner as noted above, you can obtain the same readings on any other tank without the annoyance of leaving the tank from which you wish to obtain the reading. It can be readily seen that this method of connecting is far superior to having all the switches connected direct to the volt-meter, as you can obtain your reading directly from your tank where your rheostat is located, and can make the necessary adjustments. Now, to connect a volt-meter on a three-wire double voltage system, you simply put up a double pole switch at each tank and run two wires from the volt-meter terminals to the top of switch. Next, connect the two wires from your tank from which you wish to take a reading to the bottom or blade side of the switch, being careful to get the positive and negative in their right places. Now, when you close the switch, you get your reading while at your tank, the same as in the two-wire system, only in this case you leave your switch open when not in use, whereas in the two-wire system you leave it closed on your dynamo



BRISTOL AMMETER AND VOLTMETER. MANUFACTURED BY THE BRISTOL COMPANY, WATERBURY, CONN.

wire, or else you cannot get a reading at the next tank without going back and placing the forgotten switch right.

As many platers have a volt-meter only, I wish to state right here that it is not the instrument to have if you have only one, as a volt-meter does not give you any idea of how much current is going through your tank. As a matter of fact, the more amperes the lower the voltage will be, and as it is the amperes that tell you how much metal is being deposited, that is what you want to know, for the same number of amperes will always deposit the same amount of metal in the same solution, whereas the same voltage will not, unless you have all other conditions exactly the same each time. To be sure, if you wish to know exactly the amount of metal you are depositing your solution must

be just right. As, for instance, if you are doing silver work that burnishes well you will get sixty-two and one-quarter grains per ampere hour; but if your solution gets out of order so the work does not burnish well you cannot depend on it, as it may deposit less, and with other solutions it is the same. When your solutions are right a certain number of ampere hours always deposits the same amount of metal.

An ampere-meter is particularly useful in brass plating to help you so you do not need to clean your anodes, as anodes coating over simply means you are using too much current to suit that particular solution, and with an ammeter you will soon find how many amperes it will stand without coating the anodes, and if you keep it down to that you will get more work out of a given solution than if you try to force it, because the time you save by forcing it is all lost cleaning the anodes and fixing the solution, as a solution will last a long time if you run it to keep your anodes clean. Again, with a volt and ammeter you can keep your solutions right by simply observing the readings and weight of metal deposited per ampere hour. If the weight is too low, your solution needs more metal, no matter what kind of a solution it is; but if the weight is right, and the deposit is rough, it needs conducting salts, and I am speaking of any metal, or solution rather.

Now, to connect an ampere-meter on a two-wire system, place an extra wire or run three wires from your tanks to the dynamo, and use the third for an ammeter wire. Connect the third wire with the positive side of the ammeter and connect the negative side of ammeter to the negative terminal of dynamo. Now place a single pole, double throw switch at each tank, and connect the negative wire, or work wire from tank, to the center of switch, and connect one end of switch with ammeter wire and the other end with the regular negative wire. When you want a reading throw the switch on ammeter side, and when through throw it on the regular negative side and leave it there. Repeat at each tank.

To wire an ammeter on a three-wire system you add a single pole, double throw switch between ammeter and negative wire, so you can switch to both wires. The balance of wiring is the same as for two-wire system. The meter to select will depend a good deal on the work, but a 150-ampere meter will do in most cases, but if one tank needs more current than that get one large enough for the tank that requires the most current, or get one with two shunts, so your readings will not be too close and unreadable. In manufacturing plants, or where you do the same work over and over again, you can make up a table to run a certain number of a certain article so many ampere hours, and reduce the plating expense materially. At the same time better work is done by getting a uniform deposit, and not too much metal on one piece and not enough on the other.

To sum up, with all conditions the same the higher the voltage at tank terminals with the work in, the less current is passing, and the lower the voltage the more current, but with an ammeter you get the current, which tells the rate of deposition, and that is what is especially required when you desire to produce a uniform deposition over the whole surface of the articles in the bath, and proves the value of volt and ammeters when properly and simply arranged in circuit.

THE SILVER PLATING OF THE STEEL BLADES OF TABLE KNIVES

By Charles H. Proctor.

One of our correspondents wrote us that he had experienced considerable difficulty in silver plating the steel blades of table knives, as the silver would strip or pull off of the blade after it had been in use a short time. The same difficulty was experienced in plating the handles, which was made of brittania metal, but this was obviated by using a mercury dip. Would it be advisable to copper plate the steel blades before silver plating them? This inquiry was referred to Mr. Proctor and he replies as follows:

The difficulty experienced in the non-adherence of the silver deposit upon the blades of the steel knives is due to unsatisfactory conditions at the time of deposition. The coating of the knives with copper previous to silver plating will not improve matters; in fact, this method was discarded as a failure by all the manufacturers of silver plated steel knives and forks years ago. The most satisfactory method to pursue is to reduce all the silver from the surface of the knives by the aid of a strong cyanide solution and a strong reversed current of five to six volts or more. For cathodes use carbon and arrange the positive pole, upon which the knives are placed, so that the carbon cathodes will be placed on either side of the knives, as in a regular bath, so that the metal is reduced uniformly. After the silver is removed the surface is washed, dried and polished and then the knives should be boiled out in any of the usual alkaline solutions of potash or soda. Then immerse them in undiluted hydrochloric acid and wash and scour on a tampico wheel, using sodium carbonate in the water to prevent rusting after scouring.

The articles are now ready for the bath. Frame up, wash in clean water, immerse in a 50 per cent. solution of hydrochloric acid and water, rewash and immerse directly in the strike solution. This strike should consist of:

Cyanide of Potassium	8 ozs.
Silver Chloride	½ oz.
Water	1 gal.

The voltage should be from one to one and one-half volts with the full amperage of the dynamo, and the immersion from fifteen to thirty seconds. The knives should then be placed in the regular silver bath. This bath should have very little free cyanide and should be run at a voltage not exceeding one and one-half. The amperage should be about three per dozen of knives, or four amperes per square foot of exposed surface. This is the method used by the majority of the large concerns.

Some platers use a first and second strike. In this case the first solution consists of a solution of cyanide in the proportion of six to eight ounces per gallon and one-eighth to one-quarter ounce of silver in the form of chloride. Two copper anodes are used, about three by eight inches, and two small silver anodes, about one-fourth the dimensions of the copper anodes. No deposit shows on the steel after the immersion in this strike. The knives are then immersed directly in the second strike, as before mentioned, and then into the bath. No copper should show from the copper and silver strike, and as soon as any becomes observable on the knives, more cyanide should be added to the bath. This is practically only an electric cleaner. For the deposit of silver, by following the above instructions carefully, no trouble of peeling of the deposit will be experienced.

COPPER ALLOYS FOR MOTOR CAR SERVICE

At a meeting of the Detroit branch of the Society of Automobile Engineers, held in Detroit, Mich., November 7, William H. Barr, general manager of the Lumen Bearing Company, Buffalo, N. Y., chairman of the Alloys Committee of the society, delivered a very interesting address on the subject of "Copper Alloys for Motor Service. Mr. Barr, after stating that the basic ingredients of brass and bronze were copper, tin, zinc and lead, gave a brief historical sketch of each of these metals. In reference to copper he said in part:

WM. H. BARR.

In the United States Copper is usually classified in three grades—Lake Copper, that brought from the Lake Superior region; Electrolytic Copper, that refined by the use of electric current; Casting Copper, that which is not entirely refined, but carries varying amounts of impurities, and as a result is rapidly disappearing from the commercial fields. In bronze and brass alloys, copper is the preponderant metal, being the element with which we can best alloy smaller quantities of other metals. The essential characteristics of copper are to impart strength and toughness, and in ornamental work, varying degrees of rich, red color. It is the best conductor of both heat and electricity, slightly excelling silver in the latter respect. Chemically pure silver was, for years, believed to have the highest electrical conductivity of all the metals, and accordingly was the basis for the 100 per cent. standard. Recently, however, copper has been produced in so excellent a state of purity as to indicate an electrical conductivity of 104 per cent.

The United States produces more copper than any other country, or about 65 per cent. of the total production of the world, the total amount for 1911 having been 1,090,000,000 pounds. The first mine worked in the United States was the Simsbury mine of Granby, Conn., in 1705, which proved to be of little value, and only small amounts of copper were taken from it. The specific gravity of copper is 8.82; melting point, 1,981.5 deg. Fahr., United States Bureau of Standards; the tensile strength varies with the physical condition, producing the following results: In cast copper, the tensile strength is 26,000 pounds per square inch; in bolts, 34,000 pounds, and in wire, 55,000 pounds. The tempering of copper has for years been considered a lost art, but among the latter-day scientists, the unity of opinion is that this climax of the art never existed.

TIN.

The next metal treated was tin, as follows: Tin is a white metal with a distinctly yellowish tinge, and can be rolled into very thin sheets, but its low tenacity prevents its being drawn into wire. Its specific gravity is 7.29; melting point, 449.4 deg. Fahr., United States Bureau of Standards. It has a distinctly crystalline structure and emits a peculiar crackling sound on being bent back and forth, due apparently to the rubbing of the crystals on each other. The smelting is a comparatively simple operation, as the oxide is readily reduced by carbon at a red heat. The purest metal is obtained from reverberatory furnaces. This is further refined by liquation, which consists in subjecting the metal to a low temperature on a sloping hearth, where the tin, having a low melting point, runs out, leaving the impurities behind. Tin produces a decided tempering effect in combination with copper, varying in proportion as it is used. Above 25 per cent. tin, the alloy is too hard and brittle for use.

The true bronzes are alloys having these two elements as their main constituents. Up to about 10 or 12 per cent. tin, the material, is not affected by quenching. Above that percentage quenching to the proper temperature renders the alloy softer than if slowly cooled, being directly opposite the effect which such treatment has on steel. Tin also has a high coloring effect on copper, a very small quantity being distinctly discernible. Tin in combination with the brasses or copper zinc alloys, when present in small amounts, renders the alloy more sound, more fusible and capable of taking a better polish.

ZINC.

Zinc, commercially called spelter, is the next important metal. It is of the bluish white color, of a decided crystalline nature, and at ordinary temperature quite brittle. Between 250 and 300 deg., Fahr., however, it is malleable enough to permit of rolling into thin sheets and drawing into wire. Zinc is not found in a free metallic state, but is obtained from its ores, which are chiefly sulphide of zinc and carbonate of zinc. The concentration of the ore is attended with considerable difficulty, as the associated impurities are generally of about the same weight as the ore. The specific gravity of cast zinc is 6.87; melting point, 786.9 deg. Fahr. It is a poor conductor of both heat and electricity.

The United States is the largest zinc producer of the world, New Jersey, Missouri, Kansas and Colorado containing the greatest deposits. Our total output in 1911 was 623,122,000 pounds. Of the different metals that we are considering, zinc is the only one that can, of itself, properly be called a bearing metal. Used unalloyed for bearings where strength is not essential and its brittleness is not objectionable, there is probably nothing superior to it for wearing qualities. Zinc in combination with copper produces the brasses. Very small additions of zinc render copper suitable for casting. Larger additions cause gradually increasing hardness, but not to as marked an extent as tin. Nearly 50 per cent. zinc can be added before an alloy too brittle for use is obtained. With increasing zinc contents, the strength and elongation, as well as the fusibility of the alloy increases. The coloring effect of zinc on copper is not as immediate as that caused by tin. In the high copper tin bronzes, zinc is used in small quantities of about 1 or 2 per cent., mainly for a cleansing effect. It improves the fluidity of the metal, thus making sharp, clean castings, free from blow holes. With a higher percentage, the hardness and strength of the bronze decrease, and the brasslike qualities thereby imparted, become apparent.

LEAD.

Lead has been known from remote antiquity. It is mentioned in the Bible at a period of about 3000 B. C., and articles made from the metal by the ancient Romans, in the form of water pipes, tanks, rings, etc., are still preserved. Many European countries produced lead as early as the tenth century and still supply the market. The United States leads the world at present, the annual production for 1911 having been 795,628,000 pounds, or about 40

per cent. of the world's production. The first lead in the United States was discovered near Jamestown, Va., in 1621, but the present main supply and the richest ores are obtained from the Western States. The specific gravity of lead is 11.35; melting point, 621.1 deg., Fahr., United States Bureau of Standards; tensile strength, 2,000 pounds per square inch.

Lead, in combination with copper, is exceedingly difficult to introduce in its best form, and remains undissolved as inter-crystalline material. It is, therefore, not an alloy, but rather a mechanical mixture. The action of the lead in combination with a copper tin bronze is as a lubricant, the small, free globules of lead in a bearing being very beneficial. Although lead makes the alloy hardens the metal, but at the expense of toughness. The production of various qualities of phosphor bronze depends more upon the proper proportioning of the various ingredients than upon the quantity of phosphorus.

One of the problems which must be contended with by the sales department of a brass foundry is the lack of information about phosphorus, which results in ridiculous specifications, often asking for a phosphorus content as high as 10 per cent. The specification of phosphorus can with safety be left only to the metallurgist, instead of the ordinary brass foundry foreman, who usually relies entirely upon guesswork. Phosphor bronzes should be secured only from companies of reputation, who make a specialty of their manufacture.

VIEW OF DIE CASTING DEPARTMENT IN LUMEN BEARING COMPANY'S PLANT, BUFFALO, N. Y.

dense and malleable, it has a decidedly weakening effect in that its globules break up the continuity of the crystals. A high lead bronze, 10 per cent. and up, when broken, will show a gray fracture as a result of breaking through the weaker lead globules and not through the crystals of the copper tin mixture. The same fracture, if finished and polished, will show the proper red color of the particular alloy. In brass, lead also acts as a lubricant and prevents fouling of the tools in working.

PHOSPHORUS.

Some elements, such as arsenic, antimony and sulphur, have a detrimental influence on bronze, but there is one which has a decidedly beneficial effect, and that is phosphorus. The function of phosphorus on a bronze is that of a deoxident. It cleans the metal from oxides of copper and tin, and if the correct amount is used for this purpose, none remains in the finished alloy. By the removal of these oxides the bronze is rendered more fusible and better castings are possible. Larger additions of phosphorus

HIGH COPPER ALLOYS.

High copper alloys, as related to motor car construction, may be divided into four classes: Soft phosphor bronze, hard phosphor bronze, red brass and yellow brass. Soft bronzes in general, are low in phosphorus and high in lead, the former being used solely as a purifying or deoxidizing agent. This class of bronze can only be considered for bearings, the high percentage of lead reducing the tensile strength of the alloy, so as to make it unsuitable for severe strains. Under this head may be mentioned one of the standard S. A. E. alloys, 80 copper, 10 tin, 10 lead. This combination is generally used throughout all motor car construction, and present practice among the best makers finds use for the alloy in a number of places.

It is difficult to recommend this or any other alloy to render the best service in any part of a motor car without the specific knowledge of conditions covering its use. Before making an intelligent selection it is necessary to

know the bearing pressure, character of lubrication and amount of vibration, as well as the nature and quality of the steel which is used in the rotating piece. Those phosphor bronzes commonly described as hard are generally high in both phosphorus and tin, and low in lead contents. In those cases where the phosphorus content runs as high as 1½ per cent., the tin content is necessarily under 12 per cent., or the alloy would be too brittle. The reverse is also the case, and where alloys contain a mixture of approximately 80 copper and 20 tin, the phosphor contents should not be over one-half of 1 per cent. An alloy of this character is used to withstand heavy pressures and has no place in motor car construction.

Among the high copper tin bronzes may be classed the gear bronze most generally used in the United States and abroad, being an alloy of 88 or 90 copper and from 12 to 10 tin. No standard gear bronze has yet been adopted by the Alloys Committee of the S. A. E., owing to a lack of unanimity of opinion as to what is best to recommend. A few prominent manufacturers of bronzes of their own special formula, which in some cases may be superior to a formula of 88-12 or its approximate. The composition of 90 copper and 10 aluminum has proven one of the most successful gear bronzes on the market, having an average tensile strength of 60,000 pounds (often reaching 65,000) per square inch, and wonderful bearing qualities. It has not been generally used, owing to the difficulties encountered in its manufacture, only one or two makers having solved the problem of producing perfect castings. The alloy of 88 copper, 10 tin, 2 zinc, probably the most prominent of the United States standard alloys, fills many requirements most satisfactorily, and for all around use is hard to improve upon.

Red brass, commonly known as "composition," contains a maximum of 85-86 per cent. copper. In this way it can be differentiated from the bronze class.. Too often, red brass is only an excuse for a visit to the scrap pile on the part of mediorcre brass foundrymen, where the scrap selected with varying degrees of care, depending largely on what the customer will stand for. Fortunately, this condition is being remedied, and that type of brass foundryman eliminated, through the demand by automobile engineers for a brass of uniform color and texture. One of the S. A. E. standard alloys which has given excellent satisfaction is 85 copper, 5 tin, 5 lead, 5 zinc. This alloy has an excellent color and may be used in motor car construction where severe bearing necessities or great strength is not a requirement.

THE BABBITT METAL DEPARTMENT OF THE LUMEN BEARING COMPANY'S PLANT, BUFFALO, N. Y.

Yellow brass may be sub-divided into two classes, one being the type of brass used generally for ornament. The other is manganese bronze, in which the percentage of copper and zinc runs close to yellow brass. Its tensile strength and other remarkable properties are brought about through the use of small quantities of iron, manganese, aluminum, and tin, in varying proportions. Manganese bronze being very generally used, either for experimental or permanent construction, should not be passed without comment. It is the intention to use the casting where rigidity is required, the manufacturer should be so advised. By slightly changing the composition of manganese bronze, it is possible to alter its rigidity and, consequently, its ductility, to a marked extent. In specifying manganese bronze castings, it is wise to adhere to established brands, particularly where the work is being done by your own or a local foundryman who perhaps lacks the metallurgical knowledge necessary to produce or even judge a good ingot metal. Unscrupulous refiners of scrap metals frequently offer for sale, under

the name of manganese bronze, an ingot which would be decidedly out of place in a yellow brass classification.

Manganese bronze may be used for practically all brackets, foot levers, radiator braces, and all external parts requiring strength in the body. This covers the brakes, lugs, levers, hubs, spider, steering yokes, fan pulley, dust covers, plates, brake lugs, windshields, handles, supports, hinges, buttons, latch, foot adjustment, quadrant, and any parts (not bearing parts), which require the strength of high grade steel or drop forging.

BEARINGS.

The correct and practical solution of the severe bearing requirements on the modern high-speed gasoline engine is of the utmost importance. In designing engine bearings, there are two important conditions that must be taken into consideration. First, the selection of a proper alloy, having the requisite anti-frictional qualities, and secondly, the selection of a metal having the necessary physical properties as regards strength and resilience. The latter property is the one too often neglected. A soft babbitt may have the anti-frictional requirements necessary for gasoline engine service, though, owing to its plastic nature, its physical properties render it unsuited for the work. On the other hand, a bearing made entirely of steel would have the necessary strength and resilience, but would not be anti-frictional. These anti-frictional qualities are so obviously imperative that in nearly every case these have been considered at the expense of the mechanical or physical properties of the bearing. Soft babbitts have been discarded, and for the reason stated, harder babbitts have been substituted; in many cases, die cast bearings have become generally used as crank bearings in some classes of motors.

In the light of the foregoing facts, it is not a difficult task to design the ideal bearing, for it resolves itself into combining the best anti-frictional qualities with the highest physical strength and resilience. These qualities have not been found in any one metal or alloy now known. It, therefore, becomes necessary to unite these characteristics in a bearing, and this is done by adopting the old-fashioned babbitt lined bronze shell of a modified design. For the bearing surface requirements, we select a high tin, so-called genuine babbitt, containing about 90 per cent. tin, and approximately 5 per cent. each of antimony and copper. This alloy adheres readily to the bronze shell and in its formula, is close to several well-known brands. A variation of 1 per cent. in any of the constituents will not materially affect the result. For the necessary physical property, we shall select a copper tin bronze having high strength and resilience. The constituents of this bronze should be so proportioned, that upon cooling, from the molten to the solid state, there is no eutectic formed, that is, no small portion of the alloy may have a lower melting point than the greater part of the mass.

Microscopically speaking, the alloy should possess perfect homogeneity. Neither should it deteriorate when subjected to alternating mechanical strains and changes of temperature, as would an alloy which is not free from one or more eutectics. Further, strength should not decrease with an increase of temperature, as lastly, it should be strictly a resilient metal, in that it should have the least tendency for crystallization under shock and mechanical strains. The bronze babbitt lined shell is naturally adapted to the construction of the highest class of motors, in that their rigidity makes them less comformable to a lower grade of workmanship, since they must be machined accurately in order that they may give the highest possible service. On the other hand, the genuine babbitt die cast bearings are suitable for fairly high class motor construction, as they lend themselves more readily to the construction of a moderate priced motor where the necessity for the superlative degree of accuracy of machine work and design does not exist.

It may, therefore, be concluded that the use of the die cast babbitted bearings are adapted for motors of moderate price, and the bronze babbitt lined shells for the very highest class. The permanently successful use of bronze or brass in any form can only be maintained by those engineers who recognize the necessity for improved and scientific methods. Within a comparatively short time the metallurgist and the laboratory have become recognized factors in brass foundry practice. As a result, great advances have been made in the available knowledge which we possess in regard to non-ferrous metals. As an indication of this scientific advance, it will be interesting to note that eleven years ago, there was not a single trade paper devoted to the non-ferrous metal industry. Today there are four papers of reputation devoted exclusively to the art.

From the standpoint of the automobile engineer, it would seem that the same detailed attention should be given to the non-ferrous alloys in motor car construction as is given to steel products and appliances. Too often, the decision as to what brass or bronze may be used, is left to the purchasing department, where price alone governs the selection. In making your specifications, I believe that the recommendations of the Alloys Committee of the S. A. E. (composed of men prominent in the brass world) may be safely accepted, no alloy being appointed as a standard, which is not thoroughly tried, and beyond doubt the proper one for the purpose."

NEW COPPER ALLOY.

By Robert Grimshaw.

In researches made as to the influence of the addition of cobalt to the more important metals, it was found that an alloy of cobalt and tin of about 40 and 60 was especially resistant to acids, even to the most concentrated nitric acid and such as is mingled with chlorides, as for instance common salt, which renders it more corrosive; partaking of aqua regia.

As this alloy is exceptionally brittle, hence almost useless where it is necessary to work it, this discovery was almost worthless from the practical standpoint. It was further found, however, that this alloy, dissolved in other metals which better permit mechanical working—as for instance copper—gave them a greater chemical resistance. When, for instance, enough of the above mentioned cobalt-tin alloy is dissolved in copper to make alloys containing from 80 to 95 per cent. of copper and 20 to 5 per cent. of the cobalt and tin, there is obtained a series of alloys which may not only be well filed, bored, turned, forged, etc., but have also a high degree of chemical resistance.

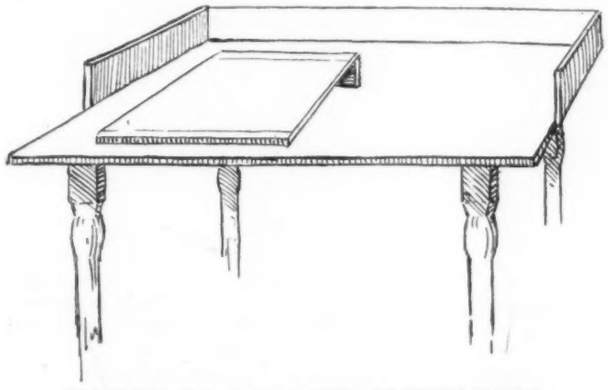
The alloys lying in these series were so little attacked by dilute acids (especially nitric) that the time theoretically required to corrode away a layer of 1 mm. (0.0394 inch) thick was calculated to be five to seven years, even on the assumption that the corrosion would take place at an even rate throughout the entire time. In reality, however, the rate of corrosion diminished, which is readily explained by the fact that where chemical action takes place the more lightly attached element is removed, while the less soluble remains on the surface and acts as a protective coating.

The preparation of these alloys can take place in the usual manner, but it seems to have been found by the experiments above named that it is best to make the cobalt-tin alloy first and dissolve it in the copper.

A JEWELRY DESIGNER'S EQUIPMENT

By Lawrence B. Robbins.*

To endeavor to lay down ironclad rules in the selection of tools and equipment for the jewelry designer is not my intention; in fact, I am afraid it would be rather an impossible task. Every designer and draughtsman has his own ideas and habits peculiar to himself, his tools are selected with a view to personal taste or efficiency, and, moreover, it is oftentimes difficult to persuade him that any other means would even be to his advantage. I realize that I myself have acquired likes and dislikes for paints, brushes or instruments which I am afraid would be hard to eradicate or lay aside for others. Then again the personal equation must be taken into consideration. Take, for example, two carpenters. One man may be able to do with a hammer and saw what the other could not accomplish with a whole kit of tools. That sounds a bit exaggerated, but it explains the point. The same will hold true of two designers of equal experience. One may have his desk littered with countless paints and instruments, and be able to turn out only mediocre work, while the other fellow with a few essential colors, a brush and a cup of water will produce the most artistic work by far.



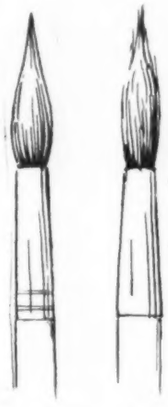
PLAIN TABLE WITH INCLINED DRAWING BOARD.

Art catalogues are snares for the uninitiated with their innumerable illustrations and prices. Paints, instruments and brushes are arrayed in profusion and therefore make it confusing to the experienced as well as the unexperienced.

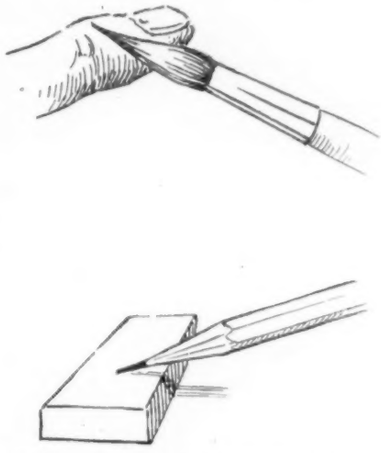
While oftentimes the "price rules the passion," don't expect to buy something for nothing. With jewelry designing in which the work must necessarily be more or less minute one can readily see how absolutely essential it is that he provide himself with the best materials he can afford to buy, no matter how few. Following is given a description of a general equipment of standard drawing materials, and while undoubtedly it will not meet with everyone's requirements, it will serve as a basis from which the designer can make his personal selection, or at any rate it may give him a hint whereby he can better his equipment.

The first requisite is a good desk or table. This may be either the swivel style mounted on an iron standard or a substantial plain table of any sort. While the regulation table is extremely handy, the common table will do very nicely, provided it is supplied with a drawer or two for materials. In case the plain table has to be used, try to get a plain pine one. Provide a raised edge about three inches high along the back and both ends as a back-stop, otherwise when working your arms will crowd your tools to the rear and sides continually depositing them on the floor. If you prefer working on an inclined surface, buy a small drawing-board, say one 17 inches by 23 inches, and on one end fasten a strip of wood wide enough to incline it to your satisfaction. This will serve to all intents and purposes. A white pine drawing board is much less liable to split than one made of white wood.

Pencils should be of the best grade obtainable. Do not acquire the habit of using hard lead. It cuts the surface of the paper, and clean erasures are practically impossible. I use Koh-i-noor with nothing harder than 2H, but preferably HB or B. These pencils are of the best grade and have the highest indorsement. Keep pencils well sharpened. For this purpose a small emery or carborundum stone is just the thing as supplement to a knife. An occasional rubbing of the lead on the stone will keep the point in the finest condition. For brushes my choice are Windsor & Newton's Red Sable. While the cost may be a bit in excess of other makes, the suppleness and uniformity of the bristles make them very desirable for delicate brush work. When buying, always try the point by dipping in water and drawing lightly over the finger, at the same time turning slowly in order to form the point. Reject any that do not show a perfect point. The fewer brushes used the better. I never use more than two sizes—one fairly large and one small, preferably No. 8 and No. 0. Even then I scarcely ever resort to the use of the smaller one except for the very finest work. I find that if a perfect brush of larger size is employed it is easier to handle, after practice, than the smaller size. In the first place, it will retain a greater amount of color and by reason of such hold the point better and longer. This does not necessitate constant dipping, which, unlike a small brush, means greater uniformity of the color you are using. When the habit is acquired of using but one brush, one will not want to change.



GOOD AND BAD BRUSH POINTS.



TRYING BRUSH POINT ON FINGER. SHARPENING LEAD ON STONE.

The subject of papers needs comment. For jewelry designing it is essential that a smooth surfaced paper be employed to preserve detail, but at the same time one that possesses *sufficient* roughness of surface in order that the washes will flow evenly with an absence of brush-laps. Most papers, while possessing these two essentials, lack some other property, and are not especially adapted to delicate work. For our purpose Strathmore illustration board (thin) is as near the acme of perfection as any.

*Expert Designer, Harwich, Mass.

Also Wardsworth & Howland's Steinbach board. Tracing paper is a necessary evil also. Any good tracing paper is suitable, as long as it is tough as well as transparent.

The colors used in water-color work are so numerous and varied that it is difficult to state with any degree of certainty what is best suited to the personal need of any one designer; nevertheless in the following list will be found the colors suitable for the general run of jewelry design in which the color of gold, silver and the various metals employed are to be reproduced. A large assortment of shades and tints are confusing and are to be avoided whenever possible, so I have named over only the few essential colors. These are practically all I ever use, and one will find it much easier to learn the characteristics of a moderate number of paints rather than be entrenched behind a multitude of useless tints and shades, the greater part of which are of no value whatever, and only take up valuable space in your kit. The handiest way to buy them is in half pans, with the exception of possibly the white, of which much larger quantities are used. This is best procured in jars, which should always be sealed to prevent drying. Should it have a tendency to dry, put in a few drops of water after using, and it will be fresh and moist for the next time. Of course a color box is a great convenience, but not necessary. If one is not used, better provide yourself with a color slab to mix your tints on. A good ground glass slab 6 inches square can be bought for 20 or 25 cents.

Following is given the list of colors previously spoken of:

Chinese White,	Yellow Ochre
Hooker's Green No. 2,	Neutral Tint
Indian Red,	Carmine
Ivory Black,	Burnt Sienna
New Blue	Brown Ochre
Prussian Blue	

Everything but the Chinese white can be bought in pans or half pans. These are more convenient than tube paints, and are always ready for use. As there are 125 or more colors and tints to select from, this list comprises the most essential. Besides the regular colors there are the so-called metallic colors, such as gold, silver and bronze. Many good drawings are spoiled by over-indulgence in such colors, and to me, unless very carefully used, they have no place on a jewelry design.

Drawing instruments come in such well selected sets there is little to be said about them. Of course, the greater variety of instruments one may have the greater facility for good work, but for the average man a first-class set may be had for about $5. Such a set would be comprised somewhat as follows: One pair 5½-in. dividers with fixed needle point, pen, pencil point and lengthening bar, one pair 5-in. plain dividers, one 3½-in. steel spring spacing dividers, one 3½-in. steel bow pen, one 3½-in. steel bow pencil, one 5½-in. ruling pen, and case of leads. These are, or should be, German silver instruments. They will be found preferable to steel for all around use. One other instrument, while not necessary, will be found a great convenience, is a pair of proportional dividers. The price ranges from $2.50 to $7.50, but are well worth the price. By its means one is able to make an exact reproduction of cuts or drawings, and by resorting to the use of certain ratios set upon the instrument to make these copies larger or smaller as desired.

Of the few other necessities, such as pens, ink erasers, etc., little need be said. Gillott pens No. 290 will be found very satisfactory for general work, their nibs being extremely pliable and tough. Higgins waterproof drawing ink is the best to use, as washes can be made directly over it without blotting. It can also be used in the stead of black paint. I use two different erasers; one, art gum, and the other, Faber's emerald rubber. The art gum is used for general cleaning of the surface of the paper. The Faber's rubber, when cut up into half a dozen strips and sharpened, makes excellent erasers for getting at small sections of the drawing.

A boxwood scale and two transparent triangles, a 45 deg. and a 30 deg. x 60 deg. are necessary additions to your equipment. This may be said to comprise a general survey of a jewelry designer's equipment, although, of course, one might elaborate to his heart's content. However, to attempt such elaboration would only serve to weave a net of uncertainty about the reader. Let me state in conclusion as a repetition of my first remark, that the simpler the layout, the better off you will be, provided, of course, your ability and artistic aspiration travel hand in hand.

TRUST CONTROL OF ALUMINUM.

[From United States Consul General Robert P. Skinner, Hamburg, Germany.]

Trust control of aluminum appears to be surrounded with considerable mystery; which is not wholly surprising, perhaps, as it is stated that the aluminum syndicate, dissolved in November, 1908, is in process of reorganization, with prospects in favor of a successful conclusion. The present state of the negotiations seems to be unknown, but an apparently well-informed commercial reporter of one of the Hamburg newspapers, after detailing the various phases of the business, concluded:

The history of the Aluminum Syndicate is a valuable contribution to the story of international cartels. One can see very plainly in this case how difficult it is to make international agreements and to carry them out. A great number of such combinations have been formed, but scarcely any of them have been very successful, as legal security and genuine mutualization of interests has been missing.

Sales are made according to the purity of the metal, the plates being usually of a weight of 22 kilos (48.5 pounds). Those of Norwegian manufacture are frequently 99 per cent. pure. Sales are also made of wire bars and nugget bars. A Hamburg dealer says that the present market price is $28.56 per 220.46 pounds.

The foreign trade of Germany was, imports, 1910, 9,892 metric tons; 1911, 10,454 tons; the share of the United States in this trade being 432 tons and 357 tons, respectively. Total exports, 1910, 613 tons; 1911, 768 tons.

EDITORIAL BOTHERATIONS.

Rolled manuscript.

Puff without substance.

Paper written on both sides.

June happenings received in October.

Indelible pencil writing—an abomination.

Capitals strewn throughout with the eyes shut.

Manuscript which has not been read over by the writer.

Single-spaced typewritten copy—special abomination

Pencil copy when the pencil has worn down to the quick.

Spelling which has an unholy contempt for the dictionary.

Obituaries just as they were read at funerals and four times too long.

Copy in which the last half of the words is nothing but a wavy line.

Articles so long that Robinson Crusoe would not have had time to read them.

A hand so large that the loop of the "h" runs up two lines and the loop of the "g" down two lines, making the page look like a bedspring.—Exchange.

THE JOINING OF METALS*

By Alex. E. Tucker, F.I.C. (Birmingham.)

The expression, "The Joining of Metals," clearly includes such processes as riveting, folding, sewing, and dowelling. As these, however, are essentially mechanical processes I do not propose to discuss them. On the other hand, I shall be able to show that many industrial operations, such as riveting and folding, are now being replaced by autogenous welding and other recently introduced means. Methods of joining metals by physical processes, such as welding and brazing, give rise to some interesting considerations, and it is the physical process involved in such operations and the commercial application of such operations which I propose to discuss. The phenomena of cohesion and adhesion, on which the joining of similar or dissimilar metals depends, are frequently referred to as one and the same thing. It is therefore well to decide whether or not this interpretation is justified, and if it is not justified, to distinguish between them. It is true that in brazing copper and soldering together two pieces of brass other actions, such as alloying, come into play; but there are many cases on which I shall enlarge where cohesion or adhesion, or both, are depended on alone for the result, and lead to important industrial applications.

The expression "welding" (A.S. *weallan,* to boil), in connection with non-ferrous metals, is borrowed from practice in iron and steel working, in which the pieces to be joined are brought to a high heat, often fusion heat, and are then hammered together. This operation is one which, from a physical point of view, illustrates the difficulty of saying whether the result is due to cohesion or adhesion. When high heats are used cohesion would appear to act, but it is well known that fusion is not required for effecting a union of several metals to bring about a joint having a great degree of strength. Two clean pieces of any soft metal, such as lead, may be hammered or pressed together and a fairly strong joint made. Analysts often readily repair a perforated platinum crucible by cleaning the metal around the hole and hammering a piece of bright platinum while the two are at a red heat.

Although there is a clear difference between the phenomena of cohesion and adhesion, and the difference is important when discussing the phenomena of joining of metals, it must be admitted that under certain conditions it is difficult to distinguish between the influence of the one and the action of the other; thus if two pieces of brass be joined by ordinary tinman's solder, it can be shown that a true alloying is obtained between the solder and the two surfaces. The strength at the surface of the pieces of brass will be the strength or adhesion of the alloy, but the strength of the work as a whole will be the strength of the intervening layer of solder. On the other hand, if instead of tinman's solder a material be used such as india-rubber, cement, or glue, or a film of oil or even water, the join will be effected by adhesion, as no molecular combination obtains between the brass and such media.

Although in the latter case the force required to separate the pieces of brass may be considerable, it appears to be limited to the surface tension of the intervening layer. This is the explanation of the well-known fact that in cementing two surfaces by an intervening layer, provided the surfaces can be "wetted" by the material forming the layer, the thinner the layer used the stronger will be the adhesion. The join will also be more permanent, because it more completely adapts itself to the changes of temperature to which the whole may be exposed, whereas if a thick mass were used it might expand unequally with it, and possibly destroy the cohesion.

*From a paper read at London meeting, Institute of Metals, September 25-26, 1912.

METHODS USED PRACTICALLY FOR JOINING METALS.

The methods in practical use for joining metals may be divided in the order of their importance, as follows:

1. By metallic cements, such as tinman's or brazing solder, which have to be brought to the plastic or liquid state, and whose constituents should be capable of alloying perfectly with the metals to be joined.
2. By autogenous fusing, in which the two parts are heated and liquid metal of the same character run around the mass, or the parts are heated to fusing point, and the surfaces worked together by pressure or hammering.
3. By the use of a cementing metal under pressure, generally that of a rolling mill, and at ordinarily or only slightly raised temperatures.

In respect to this first method, it is obvious that the fusion point of the solder must be lower than that of the articles to be joined, and as, speaking generally, the higher the melting point the stronger the solder, it follows that it is desirable that such solder or brazing spelter should be used whenever possible, the melting point of which is only a few degrees less than that of the metals to be joined. The solder should also have, if possible, the same characteristics, such as malleability, color, and hardness. This is especially important in jewelry work, and also in the brazing of copper. Such conditions may imply greater skill on the part of the operator, but the union will be the more perfect, and the process under such conditions more nearly approaches autogenous soldering.

In the jewelry trade it is usual for the workman to make his own solder, because the color and standard of purity, with respect to the contents of gold or silver, have to be very finely adjusted to the work in hand. The result is that, without any coloring of the finished work, it is often impossible to detect the joint. It is hardly necessary to say that such results are only obtained by great experience. In joining such metals as britannia metal and pewter, both of which are alloys containing much lead, very fusible solders must be used; these generally contain bismuth, and the flux used is tallow or olive oil, or its equivalent; further, instead of the flame of a blowpipe or a soldering iron being used, the workman will effect the join by directing a stream of hot air on to the parts, in this way greater control of heat being obtained.

TINMAN'S SOLDER.

In the use of this care should be especially taken to avoid the presence of zinc, and in certain cases even a trace of zinc is especially prejudicial; it thickens the solder, and probably on account of its liability to oxidation forms a superficial scum which the ordinary spirits of salt are incapable of dissolving. If the presence of zinc be suspected, the addition of a few drops of acid will help greatly. Antimony is frequently present in tinman's solder—this, by forming a cement of higher tensile strength, may, under special conditions, make a joint of greater strength. In the use of solder, either soft solder or brazing solder, it is clearly the correct method to raise the work to the highest temperature that the solder and the work will stand, because under such conditions the penetration of the solder into the surfaces to be joined will be better, and further, the soldering medium may then be squeezed out to the maximum from between the

surfaces by suitable means, and hence the requirement can be met, that the thinner the layer of cementing material and the closer the surfaces are together, the stronger the join. Additional strength, because of the additional intimacy effected, may be given to the work by rubbing the surfaces carrying the liquid solder together; in the same way it is always well to rub the soldering iron, when possible, over the work when it is used, the "wetting" of the surfaces is then more perfect, and no stripping of the solder is possible when this rubbing is done. In order to obtain a lower melting point in tin solder bismuth, and sometimes cadmium, is added. Such solders are used for delicate work, as is occasionally required for electrical fittings.

I am aware of bicycles having been built in which the tubing was fixed in the respective lugs with soft solder instead of the ordinary brazing. They stood every test, and personally, if the lugs are carefully machined to only a fraction larger than the tubes, I should prefer this method of frame building. The conditions here are very different from those in the case of the brazing of brass and copper, because it happens that all the metals employed in brazing and tinman's solders destroy the character of the steel they are intended to join if they are heated sufficiently with the steel, while they have no corresponding injurious effect when used for brass or copper work. When soft solder is used the thin gauge tubing is not so likely to be spoiled by deteriorating action on the steel, or by being oxidized at the heat necessary for brazing; and, further, on account of the greater liquidity of the soft solder, it will, when properly applied, sink into the small annular space between the lugs, etc., and the tubes more completely than can be expected with the more viscous flux and brazing solder. The reasons that soft solder is not used for such work are, firstly, because the heat of the enameling stoves makes its use risky; and secondly, popular prejudice—a soft soldered frame sounding badly to the untechnical layman.

It is a common habit of workmen, and amateurs who have soft soldering to do, to depend on the ordinary bit, when they might use a bunsen or blowpipe. These, in many cases, would heat the work more generally than is possible with the bit, and would allow of the penetration of the solder into the surfaces, and the subsequent squeezing out of the excess of solder. On the other hand, many forms of soldering bits are now in use, in which a bunsen-burner connected with a light, flexible tube is employed to heat the bit, and the flame can be conveniently made to heat the work as well. This form of soldering iron has many advantages. One of the best fluxes I have found for ordinary soldering can be easily made by macerating flux skimmings from galvanizing pots with weak hydrochloric acid. On filtering, the solution is ready for use, and is an ideal flux, because of the chloride of ammonia present with the chloride of zinc. No iron or lead is dissolved if the acid added is not in excess. Solder is often used in the form of granules or strips of various sizes, and in this form is very convenient for routine work. In the case of spectacle frames or other light articles a large amount of work can be prepared, on each of which a small piece of solder, either in the form of a granule or a strip, is placed with flux on the part to be joined. The articles are then put in a tray, which is afterwards taken to a muffle working at a convenient heat, or in some cases it is sufficient to put the work on a metal plate, heated by a gas flame or even a spirit lamp. Brass tubes are often made by bending the strip through dies, and fixing a wire of suitable composition in the overlap with borax, or the borax may be mixed with finely granulated spelter. On passing the work through a furnace to raise it to a red heat, the spelter runs perfectly and a good join is made. The flux is then dissolved off the work, and the tubes are finished by drawing through dies with or without a mandrel.

The best brazing, if it may be properly so termed, is done with "silver solder," thus the blading used in turbines is all fixed with silver solder. It is, of course, of the utmost importance that the small pieces used in the construction of turbine motors shall be immovably fixed and cemented in position, on account of the heat and centrifugal strain to which they are subjected. Various silver alloys are used, but they are generally about 60 of silver, 23 of copper, and 17 of zinc, the flux used being borax, or borax and carbonate of soda. Such a mixture is remarkably liquid when in the molten state, and on this account penetrates interstices which ordinary brazing spelter would fail to fill.

BRAZING SOLDER.

The composition of ordinary brazing solder ranges within wide limits; the analyses of samples I have examined show a variation from 61 to 33 of copper, and 39 to 67 of zinc. The tin may vary from nil to 14 per cent., and the lead from nil to as much as 3 per cent. Any of such metals may be and are used for brazing, in accordance with the character and requirements of the work to be done. The higher the percentage of copper the higher the melting point, and the higher the percentage of tin the lighter the color. We thus have a very large series of alloys available for very varied requirements. The presence of other metals when in small amounts is often of no consequence in the brazing of brass or copper, though obviously in all cases it is very desirable in important work, such as brazing of high-pressure steam pipes or where great strength is required, that the composition of the brazing metal shall approach as closely as possible to that of the metal to be joined, as only under such conditions can the maximum strength of the joint be obtained, and it is the non-observance of these conditions which has led to disaster. The skill of the workman is often limited to the fluxing of the solder, and seldom extends to an appreciation of its composition.

When, however, we come to brazing iron and steel the importance of purity is very much greater, and I have found the presence of tin in brazing solder intended for bicycle frames to be very injurious. The explanation is probably to be found in the extraordinary deleterious effect of tin on iron and steel. It is well known that a very small amount of tin scrap, if allowed to get into a bath of molten steel, will make it very red short, and when brazing solder containing as little as 0.5 per cent. of tin is used for brazing bicycle frames, I have found that the joints are very unsatisfactory and unsafe.

An ingenious method of making a brazed joint is by connecting the two parts to be joined with the terminals of a suitable dynamo. On account of the local resistance the two parts become heated, and if suitable brass wire is wrapped round the tube, in the case of a cycle frame, and the whole surrounded with a reducing gas, such as hydrogen or coal gas, a very perfect joint is obtained without any borax or other fluxing medium. The reducing gas under such conditions will ensure the absence of any oxide of iron or other metal used, and no previous cleaning is required. Such methods of joining has the great advantage that there is no borax to remove from the joint. On account of its great hardness this removal of borax is a serious matter, and much money has been spent on experiments to remove it by pickling, and other methods. It is best removed by sand-blasting, the whole frame being so treated, leaving an excellent surface, on account of its roughness, for enamelling.

(To be continued.)

MAKING GOOD ON SHIPMENTS IN THE MANUFACTURE OF PLUMBING AND STEAM BRASS GOODS

By Peter W. Blair.*

Every large manufacturing concern in the manufacture of plumbing and steam brass goods meets with the question, "How can we make good on our shipments?" Such a problem must be answered in order to meet with the approbation of the customers. As I stated in a former article† which appeared in the August, 1911 edition of The Metal Industry, service is the strongest selling point in any business. Goods being equal, service demands a premium in many instances which means promptness and reliability. Every customer appreciates attention. Acknowledge his orders and keep after them until they are shipped, keeping him advised in the meantime of any changes in probable shipping date. You will then have fewer occasions for complaint. Fully half of the complaints received from customers refer to the way in which their orders have been handled or held up. It is possible to make each order a separate matter, so that each customer will believe he is favored by personal attention. A system for handling customers' orders in use by a large brass manufacturing concern in the Middle West manufacturing plumbing and steam brass goods has proven most effective. The system in question was of natural growth, as the desires and needs of factory and customer became manifest.

KEEPING TRACK OF ORDERS.

In the first place, as the orders are received they are time-stamped and then gone over by the order clerk and stamped "Approved," providing they are correct in every particular. They are next copied on sheets similar to form 1.

No.....Date of Letter.....Received .....
Ship to .....Terms .....
Address.....Copied by.....
.....Examined by .....
Customer's
Charge to .....Order No.....
.....
.....

Form 1. After the orders received are time-stamped and when they have been approved by the order clerk to see that no details are lacking, the information is copied on this sheet. Each department interested receives a copy of the order, and each set of sheets, as well as the customer's original order, is numbered consecutively.

As the different departments of the factory manufacture different classes of goods, these classes are put on as many enumerated sheets as there are goods enumerated by the customer's order. Thus if the order calls for brass valves and basin cocks and cast iron fittings, a sheet for each is made in triplicate, as the brass valves and basin cocks are made in different departments; also the cast iron fittings in a separate department. Each sheet, as well as the customer's original order, is numbered in the upper left hand corner. Each set, of course, is numbered consecutively. This number, it will be observed, acts as a kind of tracer number. Each of the slips are made out in the above case are stamped, as shown in Fig. 2. The stamp placed on the copy calling for brass goods has cast iron fittings checked, as these goods will not be worked in the brass department, and the one calling for cast iron fittings has the brass valves checked, as there will be no work on same done in the brass department, so that no matter which slip or part of an order one has on hand, by looking at the stamp he can tell whether it is entire. The customer's original order is filed in a vertical cabinet under the firm name, and the slips are placed in a case numerically.

The original and duplicate slips are next sent to the storekeeper, where each item is stamped with one of the three headings, "Stock on Hand," "Stock Ordered" or "Castings." The meaning of the first two stamps is evident, while the third simply means that the rough castings are on hand. A simple and effective method is pursued by the warehouse stockkeeper to give him this information. A ledger book is divided into columns so arranged as to give quickly the above information, one column is reserved for a record of all orders received, a daily report from the shipping room of all goods shipped, and one from the factory of all goods turned into the bins, and one from the foundry of castings made, balances the book. When the slip calls for a promise the stock clerk stamps his estimate in the lower right hand corner of both slips. When the order calls for special goods not carried in stock or catalogue, an order is placed in factory at once for the above goods as per Figs. 3 and 4, as there is always a delay on special goods, owing to changes in core boxes and patterns; also in manufacturing.

Order. Brass Room. Date.....19..
C. L. K. Flg'd Fitt's Brass Brass
Mall. Amma Fitt's.
Nipples Drain Fitt's
Tools.
When Order is Filed return this slip to Shipping Room.
When castings are out return this slip to Brass Room.
Foreman.....

Form 2 (front card); Blank or order slip for checking by items.

Order for Special Goods.

Date.....191.. No.....
D No..... Drawing No..... Blue Print No.....
Promised for .....191..
Papers with order .....
No.....

Labor.

Operation.	Date.	Hrs.	Rate.	Amt.

Material.

Operation.	Date.	Hrs.	Rate.	Amt.	Kind.	Wgt.	Pr.

FIG. 3.

REVERSE SIDE.

Total Labor.
Total Material.
Shop Expense.
Percentage Added.
Total.

FIG. 4.

*Foreman, Brass Finishing Department, H. Mueller Manufacturing Company, Decatur, Ill.
†Business System for Manufacturing Plumbing, Brass Goods, etc.

As many copies are made as there are departments called upon for the production. Each item is given a shop number which is written opposite the item on the slips. This number is also on each copy, one copy is made on a card printed the same as Fig. 3; the back, however, is printed as shown in Fig. 4. This card is used as a permanent record of cost and is filed away by the cost department, after total cost of goods has been secured from the slips, and proves of great advantage when estimating cost of goods of a similar kind at any time, or should the same article be manufactured within six months or a year, it would be possible to secure cost of same by referring to this card, as it gives the desired information. Each department fills out its slip on cost of special goods with the men's time and material used, and so on, as well as with any goods that prove defective.

Cost of manufacture on regular goods are taken from time to time in striking an average cost of producing any item. This is done where competition is keen on certain lines, and to make up new discount sheets for the trade. A slip register is used in the promise department for keeping track of orders until filled. A large book specially ruled is used for this purpose. The columns are filled out from the duplicate slips before they are put on the different files. They are, of course, arranged numerically. A check is put in each of the columns called for on the slips. The promise which the stockkeeper made is entered and the order department notified. Promises to start with are always made where possible on complete shipments and only when requested. Should the stockkeeper be unable to give a definite date of promise of shipment, he finds out the amount of equipment there is in rough casting stock department and sees the foundry foreman personally first, and has him give a date when goods will be delivered to finishing department, having same sign a

ORDER NO.....

CUSTOMER .....

A/C .....

GOODS .....

PROMISES.

Fdry.	Fin.	Ass.	Plt. & N. P.

FIG. 5.

blank, as per Fig. 5, taking the signature of the other foreman in a similar manner. The order is then placed in the factory with special tag attached to same, which then shows the different departments when goods will be delivered to them from another department. Each foreman keeps a stock of these tags on hand, and they accompany the goods through the different processes of manufacture until they arrive at finished stock department.

HANDLING EXPRESS ORDERS.

As there are quite a number of express orders received on plumbing goods that are not a staple line or carried in stock and the orders are of small quantities, a time limit of thirty-six hours has been placed on them after receipt of order. They are written up on same blank as Fig. 1, and as a distinguishing mark the paper used is salmon color, and they are always given preference over any other orders on file in factory. Two days before a shipment is due the promise slips are drawn out and investigated to make sure the goods will be shipped as promised. If it is found the promise cannot be carried out, the date is extended. The customer is notified and the promise slip sent to the tracing department, together with the promise of completion. As quite a number of future orders are received, shipment to be made in sixty or ninety days and customer wires or writes in to rush at once all or parts of it, the shipping room looks up this order at once, attends to it, and notifies the tracing department of the goods they can ship at once. The tracing clerk finds out in the different departments of the factory what progress has been made on the balance of the order, and if the stock on hand is too small to justify in shipping by itself, it is held until more goods are received or pushed to completion in the factory.

HOW SHIPMENTS ARE MADE.

Much unnecessary expense is thus avoided in the way of freight charges, often securing a minimum charge or making a carload rate possible. The method in which these possible shipments are handled so that the shipping clerk may know what to expect may bear a word. In the first place, all firms placing orders are given a number. If these customers place more than one order per month their order is placed on a large board. A firm's number on this board is permanent. The board is kept in the tracing department, which is situated next to the shipping room. Hooks in regular rows cover the board. Perpendicularly the rows fall under certain headings, representing the different departments in the factory. Horizontally they extend out from a firm's number. Now it is a very easy matter for the clerk in charge of the tracing board to take his promise slip and hang opposite the firm's number and immediately under the department where the goods are located.

When the shipping clerks receive any goods for shipment they pull out copy of order and go to tracing board, ascertain what more goods are necessary to fill the order and are guided accordingly. They see that some bath cocks are in buffing room and some brass ells are being tapped in finishing department. They will undoubtedly be in the shipping department the following day, which makes the order complete. All goods which are being pushed through the factory upon which a promise has been made a customer are red-tagged. The tag bears the customer's number and name, and the number of pieces and promise date. This is found to be of considerable help to factory in locating goods for promise and rushing an order.

When the goods are packed a list is made out in triplicate. One copy is mailed at once to the customer, as a bill of lading. The second copy goes to promise department for the purpose of checking the order slips. The original order slip and the shipping list are then turned over to the billing department, where the price clerk enters the discounts, obtains the cost on special goods and makes the net prices on a given per cent. of profit. In each package, barrel or box shipped is placed a claim form. This is supposed to be filled in by the customer if he has any complaints to make.

There are times when the factory falls down on promises, and these must be reported in writing to the superintendent by the foreman of the department who has failed to deliver the goods on time. By this method all delays and cause of them can be ascertained at once and prevention of a recurrence or negligence of some one in not doing his duty. Too much importance cannot be placed on the manner in which orders are put through the factory. As oil is to machinery, so is system to business; they both run with less friction and loss of energy. And with all departments working in harmony with one another, best results will be derived and orders will be filled on time.

POLISHING WHEELS, THEIR CONSTRUCTION, USE, CARE AND ABUSE

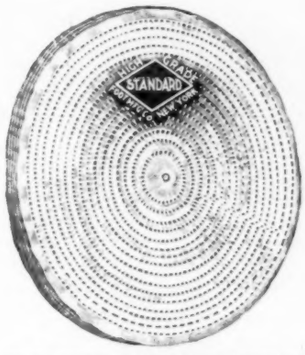
THE FOURTH PAPER OF A SERIES DESCRIBING THE VARIOUS TYPES OF POLISHING WHEELS.

BY T. C. EICHSTAEDT.*

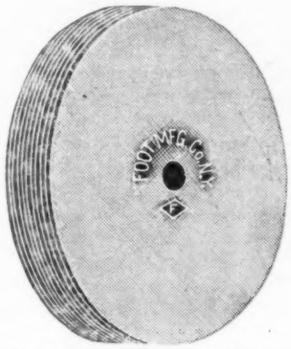
(Concluded from May.)

SEWED BUFF POLISHING WHEELS.

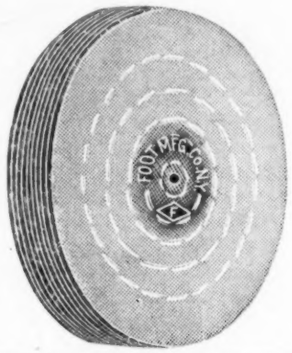
Polishing wheels made of sewed buffs have been in use for some twenty years or more for roughing and fining, and of late years for finishing. These wheels are made up of very cheap material, and give good service when properly made and used. But if not properly made they are an expensive proposition to the owners of the polishing room on account of the glue and emery which they consume. There are many different ways of making these wheels. When the writer first saw them made in the old bicycle days, when wheels were scarce and in great demand, they were made of any kind of buffs that could be obtained. These sections of buffs were then taken to the glue stands and glued on both sides and laid on top of one another until the required thickness of the wheel wanted was reached; then nails were driven through and clinched. One row of nails was driven in close to the hole and another about half way between the hole and the outside edge of the wheel. Then the wheel would be put under a boxful of heavy work or a keg of emery, to press it for a day or so. Sometimes the weight would be placed on the wheel without shifting and sometimes someone would come along, not knowing that a wheel was under a box or keg, and sit on it or lean against it, and in that way shift the wheel out of shape, making the hole crooked. These were the good old days when polishers had their own troubles. Then, after the wheel had dried it would be taken to a lathe to be turned down. Sometimes it would run correctly, but more often a pound of lead would be necessary to balance it. When it was finally turned down it would be sized up and glued on both sides. A piece of heavy factory paper was put on the sides or a piece of canvas, if one could get it, and then it would be dried and again glued and rolled in emery and dried, after which these operations were repeated.



BLEACHED STANDARD MUSLIN



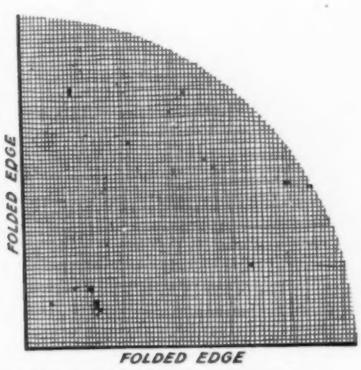
SOLID CEMENTED CANVAS WHEEL.



OPEN HAND-SEWED CANVAS WHEEL.

BUFF WHEELS MADE BY FOOT MANUFACTURING COMPANY, JERSEY CITY, N. J.

The wheel was then ready for use or to be worn down, for these wheels never worked satisfactorily until they had been used at least a week. They would have to be pounded, cleaned off, reset, pounded again and balanced again and again, until they were as good a wheel as one could get at that time. There are still a great many of them in use, and many men swear by them and think they are saving quite an amount of money for their company by making and using these wheels. But they are only saving in the first cost of the wheel, as they consume more emery and glue for the amount of work done on them than any other wheel I know of, and the life of sewed buffs is short, as they must be cleaned off quite often.



"TRIPLEX" MUSLIN BUFF WHEEL AND METHOD OF FOLDING. MADE BY MUNNING-LOEB COMPANY, MATAWAN, N. J.

MUSLIN BUFF WHEEL. MADE BY BENNET-O'CONNELL COMPANY, CHICAGO, ILL.

*Expert Polisher, Detroit, Michigan.

Each time they are cleaned off in the old way with a pipe end, solid emery, buff stick and file. This is a very dirty, dusty job, and at least one-quarter of an inch of wheel is cut off before it is again in good running shape. Then the time consumed is also quite an item, not only for the cleaning off operation, but for the resetting each time it is worn out. There are some who say, "but the men work piecework and the company does not lose on that score." But they do, for if a man had a set of wheels that would wear twice as long, twice as much work could be done for one setting up and only half as many wheels would be required per day to do the roughing out and fining down. Also if the polisher did not have to clean one off once a month he would only be using one-half as much glue and emery, and he could spend the time necessary for these operations in doing actual polishing work. The old-fashioned sewed buff polishing wheel has had its day, and is now a back number, and is, in fact, the most expensive wheel used. Still the fallacy of the low initial cost keeps many of them in use.

There are many foremen who say they have improved on the old-fashioned sewed buff. One man says he soaks his sections in glue water and dries them out thoroughly before putting them together. He has a press made to press them in and lets them stay in it for a day or sometimes for twenty-four hours. No nails are used in his wheels, and so on, a hundred different improvements are mentioned. The writer has been around quite a lot and only knows of one place where there has been an improvement made on these wheels that is really successful. This improved wheel is equal to any wheel for general utility, and is especially valuable for stove work. In fact, it surpasses the felt, bull neck, sheepskin and walrus hide wheels for finishing. This wheel will outlast five of the old-time sewed buffs, and is good to the core; whereas, the old-time wheel would not last more than one year at most, this new product will last five years in constant use every day.

CANVAS BUFF WHEELS. MADE BY BENNETT-O'CONNELL COMPANY, CHICAGO, ILL.

The process of making these wheels is very simple when understood, but it is not only the process that is needed as it is the experience in using the process, which is patented, so I cannot describe it in full. However, I can say this much, that the sections are stitched and are made specially for this purpose. They are then treated and balanced before gluing; after which they are glued together, placed in a press for not over one-half hour. When this wheel is finally turned down it is generally in perfect balance and, generally speaking, rarely needs balancing thereafter. These wheels are made so that they are either hard, soft or medium. These wheels are known as the "Universal" because they can be used for almost any kind of work. The Michigan Stove Works of Detroit, Michigan, have used this wheel for six years, and at the present time are using it exclusively, as their foreman, Mr. Cochell, is the inventor.

A great many polishers have trouble with this wheel because they do not understand it. It cannot be treated as other sewed buff polishing wheels are treated, and the secret of success in its use is in the care that is given it. As this wheel was fully described in a former article* I do not think it will be necessary for me to repeat the instructions. It is the writer's opinion that the only reason why this wheel has not been a howling success is because it has not been properly introduced, and therefore has not had a fair trial by the polishing foremen. Simply because it is made up of sewed buffs it has been misused, maltreated and condemned. But if properly made and used and cared for, the Universal polishing wheel is the best all-around wheel there is on the market today.

THE UNION CANVAS WHEEL.

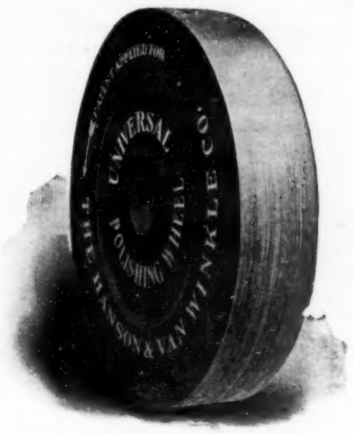
This wheel has also had its day; it had its place and filled it well. At the time it was introduced it was needed very badly, and I have used quite a number of them. This wheel is made up of canvas, about three-thirty-seconds of an inch in thickness, and is put together with rubber cement. This canvas is bought in large sheets and cut up into disks of the required size; then it is covered with a solution of rubber cement and stitched together; after which it is put under high pressure and finally bored and turned down to shape. This wheel works hard at first and must be used quite a while before it is in good working order. I used to rough and fine flat work on them for a while, say, for a week to a month, and in that way wore them down to a good resilient surface. These wheels also need proper care, just the same as any good tool, and I shall endeavor here to give the directions for their care.

It must always be remembered that they are put together with a rubber cement, and therefore care must be taken not to get the wheel hot, as heat will loosen the cement and cause the wheel to come apart. It must also be taken into consideration that one must not work the wheel too hard for the same reason. I cannot say that the Union canvas wheel does all that is claimed for it; even under the best of care the life of a fourteen-inch wheel of 2½ to 3-inch face will not be more than a year if used daily, for after that the wheel becomes soft and must be discarded, as its life is gone. It is true that it can be glued or nailed together again, but the time taken to do this does not pay for the use that will be gotten from the

*THE METAL INDUSTRY, November, 1909.

wheel, and it will not hold the emery. In order to keep this wheel in good shape it must be right to start; that is to say, size of hole must be a little under the size of the spindle, and it must be kept that way. The wheel must also be balanced and turned down to run true and then kept that way. In cleaning it off care should be taken not to get the wheel too hot, and it should not be placed in a hot place to dry. One can get fairly good results from the Union wheel, but the Universal wheel is superior in every way. First, the life of the Universal is three times as great; second, the Union cannot be used for a finishing wheel; third, the Universal wheel will never come apart if made properly.

It may seem that I am prejudiced or showing favor, but my only objects are to express the opinions which I have formulated during my long experience as a polisher, and try to give the reader information regarding the different kinds of polishing wheels and how to use and take care of them. I trust that my articles may have been of some use to those who have not had experience, and as to those who have had the experience, I hope they know whereof I write. I am, of course, open to criticism.



UNIVERSAL CANVAS BUFF WHEEL. MADE BY HANSON-VAN WINKLE COMPANY, NEWARK, N. J.

CANVAS BUFF WHEEL. MADE BY L'HOMMEDIEU & SONS COMPANY, CHICAGO, ILL.

APPLICATIONS OF THE SANDBLAST TO GOLD AND SILVER INDUSTRIES

By Frank Mason.*

The continued demand for variety in the finish and appearance of gold, silver, and electro-plated goods, gives to the sandblast such a wide field of operation as to be almost unlimited, and the opportunities, now opening up, for its application are without parallel in its history. As a ready means of imparting to silver and other surfaces, at a small cost, a finish, very pleasing to the eye, it is hard to rival. Sandblasting is by no means new, and has been in operation a considerable number of years, but its usefulness in the above mentioned direction would appear to have been either neglected or unnoticed in many manufactories, where it might be employed to great advantage. Its use, of course, is not merely confined to silver and gold, and when viewed from the broader field, its applications are extremely wide, being utilized for a number of purposes in the glass, china, iron and steel and other industries. No attempt, however, will be made here to describe its connection with these latter processes.

In contrast to the blasting required for gold and silver, that for iron and steel is very coarse and is applied very often for cleansing purposes. This, of course, would be totally unsuitable for the majority of articles plated with, or composed of the nobler metals. From the number of machines specially built for different classes of work, constantly being placed on the market, it would seem that blasting machine manufacturers are alive to the possibilities of their productions. These are now so numerous that to select the most suitable would be almost impossible without first being acquainted with the class of work to be done. In view of this fact, it is the intention of the writer to guide the would-be sandblaster in this selection, by a description of the conditions which exist when imparting to gold, silver and electro-plate a variety of finished surfaces. Briefly expressed, the process of sandblasting is one which consists essentially in forcing a stream of sand or other abrasive material against a metallic or other surface for the purpose of altering its characteristic appearance. The two chief governing factors of the process are, the pressure and the material used. Obviously, therefore, the method of procedure may be varied in two directions.

1. By varying the pressure used in forcing the blasting material against the article.

2. By using material with varying cutting properties and of different grain.

A matte may be obtained in the former case, which is very deep or slight, but not necessarily coarse, even under a pressure of 18 to 20 pounds per square inch. This factor (the power), then governs to a large extent the depth of the matte and varies between about 2 to 20 pounds per square inch, according to class of work, and desired ultimate appearance. The question of blasting material is one of undoubted importance and yet strange to say, is very often overlooked. It is not uncommon to find practical sandblasters of from 15 to 20 years' experience having used sand only and that in perhaps only two grades.

Some time ago it was the writer's privilege to visit two large English sandblasting works and in both cases the above mentioned conditions obtained, and the only means of imparting a relative fine or coarse matted surface was to increase or decrease the pressure. A visit to a continental plate and jewelry establishment would

*Assistant Demonstrator in Electro-Metallurgy, Department of Applied Science, University of Sheffield.

very quickly convince the sandblaster laboring under these conditions, of the obvious difficulties he would encounter in endeavoring to produce such surfaces as he would see displayed in a first-class house. The peculiarly frosted, delicate, French grey finish so dear to the artistic Parisienne, and to be seen all over the continent is a striking example of the careful manipulation and the delicate treatment necessary in some sandblasting operations. In this class of work this process is the last to which the article is submitted, hence its requirement of very careful treatment, judicious selection of blasting material and well regulated low pressure.

This finish is very often seen on silver toilet mounts and jewelry, but of course can be and is imparted to larger surfaces. The article, when ready is "Oxidized" by means of antimony chloride, relieved when necessary, and then blasted with finely powdered pumice at a pressure not exceeding 3 pounds per square inch. It will be obvious that to use a much higher pressure and coarse grained material would spoil the work put into the article just prior to this operation. The article is then washed out as if finished on the polishing wheel, or by hand.

Another instance in which very careful manipulation is required is in the production of the lovely, soft, greenish gold tint so much admired. This is obtained on gold-plated articles, as well as those manufactured wholly from the metal itself. Here again under even a moderate pressure from the sandblast, the deposit of gold would be completely spoiled. The method adopted in most cases to obtain the above finish is first to gild or gold-plate the articles, bringing them from the gold bath a little darker in color than is required in the finished appearance. If heavily coated, scratch brush, preferably with very fine German silver wire brush, and blast with flour of pumice under a pressure not exceeding 3 pounds per square inch. Wash away any pumice clinging to the article and wipe with very soft chamois leather. The resultant finish will be one which finds favor with the buyer of delicate jewelry, etc.

While discussing gold and gold-plated goods, it should be pointed out that almost all kinds of material used in blasting are also used in this connection. The difference in the above described process and those to which the reader is now referred being, that while in the former instances the blasting is the last operation, in the latter it is blasted just before being plated. In selecting the material and pressure to be used, the operator must be guided by the desired ultimate finish. For instance, in some cases a somewhat dull and exceedingly fine matted surface is required. A pressure of 8 to 10 pounds per square inch with finely divided pumice as blasting material will give this appearance. Then again, it is often required to produce on silver and gold a similar matte but bright. In this case substitute powdered glass for pumice.

A very fine surface appearance, usually employed on articles having parts in high relief, is obtained by means of the sandblast on "Oxidized" silver as follows:

The process of sandblasting should be operated just prior to silver plating using powdered pumice and a pressure of about 12 pounds. After completing the deposit, "oxidize" same in a solution of potassium sulphide until the article assumes a rich deep blue, or blue black color. Then by means of a calico mop or dolly and Trent sand, relieve where necessary according to design. The result of this process is quite a study in light and shade and is productive of some very fine effects. Satin finish, now often produced by means of the sandblast, is a term used to indicate the appearance of articles bearing a matted surface. This definition of the particular finish referred to, is perhaps the safest one to give on this occasion as the term is applied by different persons with "satin finish" ideas varying from coarse to very finely matted surfaces, and all grades between these two. The method which is found to be most satisfactory is to employ a pressure of about 14 pounds per square inch, using as blasting material a medium grain Calais sand, previously sifted. It may be well to mention that these conditions obtain in the majority of instances where table plate, etc., is required to have the matted surface throughout. The articles are then silver or gold plated by the ordinary method, if necessary.

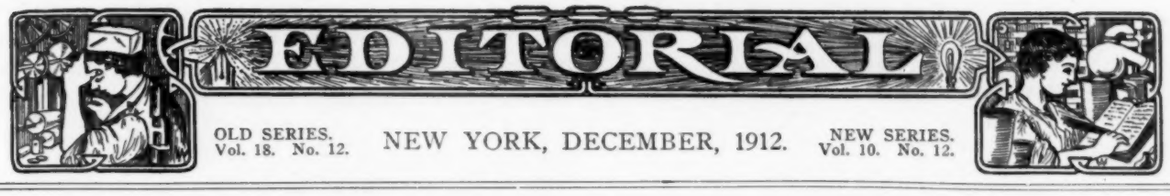
Crystalline, ice-like surfaces similar to some molded glass wares, are sometimes desired. It is necessary in these cases to employ a high pressure, say 18 pounds per square inch. As blasting material, a coarsely ground glass or very coarse sand should be used. This, of course, is done before plating, and as it is quick and severe in operation must not be overdone by prolonged blasting. "Partial frosting," as the term suggests, is the production on one surface of a combination of matted and brilliantly burnished parts.

This gives to the article a very pleasing contrast and is imparted thereto by means of the stencil. It may be accomplished very readily by cutting from ordinary writing paper or similar material the pattern or parts to be left bright or burnished, and then glue same to the article. Allow to set thoroughly, and sandblast unprotected portions. The glued paper is easily removed by suspending the article in hot water. Subsequent processes, such as plating, etc., may then be proceeded with.

To obtain the necessary pressure in all the foregoing operations, either compressed air or steam is used. In selecting the more suitable power for any specific work, it is well to bear in mind that if powdered pumice is intended for use steam pressure is out of the question, because, as the steam condenses it often impedes and eventually stops the action by clogging the course with wet pumice. Referring to the initial costs of the two systems, one is bound to say that steam pressure is the cheaper, generally. Of course, where compressed air is ready at hand, the above statement does not apply. If, however, matted surfaces much finer than the generally accepted satin finish is desired, then the operator will be well advised to install compressed air plant, although the cost may be greater.

ALUMINUM IN THE SICK ROOM.

Many an aching head and swollen face has been relieved by the application of cloth compresses, either cold or hot. These being moist, however, there was every chance of the pillow or bedding becoming wet or saturated. This made it very uncomfortable for the patient. Professor G. Gaerntner, of Vienna, has now introduced a device, the use of which is said to remove the objection just mentioned. It consists of aluminum tubing, which is wound into the shape of a cap, and is fitted over the patient's head. The upper end of the tubing is inserted in a vessel containing water of the required temperature. This is situated at the bedside, and higher than the patient's head. The water trickles slowly through the tubing into another receptacle situated lower down at the other side of the bed. Not only is this apparatus being used to a considerable extent in Germany and Austria, but it is also included in the equipment of the medical corps of the German troops in the African colonies, country houses, in hospitals, and on board small sailing vessels and yachts.—Dr. Leonard K. Hirschberg (John Hopkins).



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THE METAL INDUSTRY

With Which are Incorporated
THE ALUMINUM WORLD
THE BRASS FOUNDER AND FINISHER
THE ELECTRO-PLATERS' REVIEW, COPPER AND BRASS

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Sworn to and subscribed before me this 3rd day of October, 1912.—O. J. Lewis, Notary Public, State of New York. (My commission expires March 30th, 1914.)

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CONTENTS

BRASS MAKING

The art of making brass has been receiving considerable attention lately from people who are interested in the subject from the "conservation of metals" point of view, and in this way are apt to lose sight of the eminently practical side. Among the various methods proposed is an innovation which is described in a United States patent (No. 1,041,940), issued October 22, 1912, to Lawrence Addicks, of Chrome, N. J. The patent specification recites the methods in use at the present time for the manufacture of brass. Special stress is placed upon the loss of zinc attendant upon the practice of melting copper in small units and then adding the zinc. The patent also states that the reverberatory furnace has been proposed to make brass in, but has been found not adapted because of the difficulty in maintaining the quality of the brass produced. Continuing, the inventor says:

"The object of this invention is to overcome the obstacles that have stood in the way of using the reverberatory furnace, or a similar large source of heat, and to produce brass on a large scale and at a price for labor not much exceeding the casting of copper ingots by the copper refiner.

"To carry out my invention, I melt in a reverberatory furnace, or similar source of heat, a full charge of copper, such as is put into the furnace by the copper melters. The size of these charges varies from 20 to 250 tons per twenty-four hours, and the method is in no way changed from ordinary copper melting. Into the furnace are placed copper cathodes or copper in the shape of ingots, or in any form desired, and the same are reduced to the molten state. I now provide an intermediate ladle, such, for instance, as the ordinary back gear crane ladle, in common use in foundries, suitably lined with fire clay.

"Convenient size for the intermediate ladle will be a capacity of two or three tons. I draw into the intermediate ladle a fraction of the furnace charge, and introduce thereinto the desired quantity of zinc, quickly incorporating it into the copper. The two or three tons of brass are then promptly drawn off from the ladle and cast into ingots, or other desired shapes.

"It is evident that the molten copper will be delivered to the ladle at no greater cost than to the molds in which copper ingots are cast, and that, therefore, the entire cost of making the brass will be simply the cost of materials, plus whatever zinc loss is involved, plus the ladling cost, which will be little more than that of ladling the original copper ingots. I can, of course, from one furnace charge, produce a different brass composition in each intermediate ladle charge, by changing the relative proportions of the copper and zinc put into the ladle.

"My invention thus eliminates entirely a large part of the present brass founding cost. The exact quantity that can be handled to advantage at a time will be largely determined by the loss of zinc that is encountered, and this quantity of copper can be regulated within quite wide limits, according to circumstances, but a suitable amount will be found to be from one to three tons. It is evident that any suitable and convenient source of heat may be used, the only condition for working rapidly and on a large scale being that said heat source shall

be capable of melting large amounts of copper at one charge. By the term 'brass' as used herein is meant any alloy of copper and zinc, with or without the addition of other metals; and thus includes for example German silver, and high brasses, sometimes called bronzes."

At first glance the above process appears to be an excellent scheme for the large manufacturer of brass to cut down his spelter losses and production costs. When we come to study over the problem, however, there are one or two points which seem to us to offer serious obstacles to the successful operation of the process on a commercial basis. The first question which strikes us as being a drawback to the adoption of the process is that of stirring. If a large amount of copper is treated with zinc to form a certain brass mixture, the mass certainly must be thoroughly stirred before being poured, and while some form of mechanical stirrer might be devised, we fear that the spelter loss would be greater in proportion than in small units, and also the fact that the mass of metal would be rapidly cooling all the while would militate against such a practice. Again, a mass of brass two or three tons in quantity would necessarily have to be poured quickly if for rolling mill practice, in order to get the ladle entirely emptied before the metal chilled. In brass foundry work this quick pouring necessity would be even more serious because of the fact that various kinds of castings require the metal to be poured at various temperatures, and it seems to us that this can be done better from small units than to start at the top of the scale with a large ladleful and go on down the list. If the metal in the large ladle should be poured into ingots for remelting, then there is not much gained, for the loss in spelter incurred in the first mixing, plus that of the remelt, would probably be more than that met with in a first mix by the crucible method.

The question of scrap offers, we think, the most serious objection to making commercial brass by Mr. Addicks' process. In all large brass mills the scrap problem is most important. The average wrought brass that is made today is composed of anywhere from 20 to 40 per cent. of scrap with the balance new stock. In some classes of brass the percentage is even higher. Every mill making brass must not only use up its own scrap, buy back that of its customers, but also buy scrap on the outside, for the prices ruling for brass products do not admit of all new material except in some special cases, which do not cover very large tonnage. In brass casting work this also holds true, in fact, more so, for in some cases practically all scrap is used in making some classes of goods. Of course, the use of scrap is absolutely prohibitory in the Addicks' method, and if you cut off the brass man's scrap, you close down his business, aside from the fact that in a good many cases better brass can be made by the use of some scrap than from all new material.

THE METAL INDUSTRY has no desire at any time to attempt to detract from the commercial value of an apparatus, method, or process patented, or otherwise, but on the contrary is always willing to learn, and we hope the above criticisms will be taken in the spirit in which they are meant, i. e., rather in the form of suggestions as to improvements in the process. The process as outlined in the patent is novel and interesting, and we would be pleased to hear what Mr. Addicks has to say of the application of his method for making brass in large quantities.

JANUARY NUMBER

With our January issue of 1913 THE METAL INDUSTRY will have passed its tenth birthday and we will enter on our eleventh year. We have planned to celebrate this event by issuing a number which will be larger, better and more interesting than any former issue. It will be a number which everyone in the metal business will care to read, and in which it will be profitable for everyone to advertise, who manufactures for and sells to the metal industry (every kind of metal shop except the iron), metals, machinery and supplies.

TARIFF REDUCTION

With the coming change in the administration of Government affairs, when the reins will be handed over to the Democratic party, there is to be seen a general feeling of unrest in some business circles. With a threatened drastic reduction of tariff, particularly upon the class of goods known as luxuries, there is of course considerable agitation among those who are dependent for their present existence on the manufacture of such goods. Among the industries in this country that would be hardest hit by a downward revision of the tariff is that of jewelry, particularly the cheap variety. Believing that some idea of how the trade in general regarded the possible lowering of the tariff would be interesting, THE METAL INDUSTRY has gathered some data upon the subject. Our correspondent in Newark, N. J., a town noted for its manufacture of jewelry, cheap and otherwise, has made the following report upon the situation:

The manufacturers of jewelry fear the talk and continual agitation of a lower tariff on anything except the necessities of life. A little lowering of the tariff on high-grade jewelry would not matter so much, as labor is the main cost of manufacture, but in cheap jewelry lines, where gold is the main cost, the factories would have to close up if the duty was lowered even a little bit. The manufacturers of watch cases do not care so much, as this country exports a great many, and only the high-grade watch cases of foreign make come into this country. But as to watch materials, this country could not compete with the factories of Switzerland any more than the makers of the lower grades of jewelry could compete with the trade in France, Germany, Austria, etc. In the making of cheap metal novelties this country cannot compete with England, France, Germany and Austria, but in the high-grade lines, where there is a larger profit, that would be possible, provided the duty was not lowered much. The watch trade is on such a firm foundation that the duty could be lowered some without crippling this industry. The duty on jewels for the watch and electric trades and for meters, made of agate, sapphire and

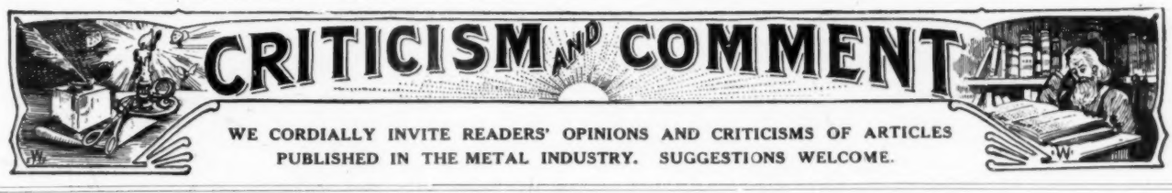
diamonds, is not high enough, and even now, when wages are reduced here to a minimum, the factories using these can buy just as cheap in Europe, and many hands are thrown out of employment in this country.

The manufacture of silver novelties also comes in strong competition with those of European make, as well as cut glass. The pearl factories here can now hardly compete with the manufacturers of England, France, Germany and Austria, where the employees make $4.00-$5.00 a week, while in Newark they make from $12.00-$15.00 a week. But the worst feature is Japan, which has increased the manufacture of these lines 100 per cent. each year, and the wages there are $1.50 a week. It is absolutely impossible to compete with that country, and the duty should be 30 per cent. higher.

In the ivory line labor is about 60 per cent. of the cost of manufacture and could not stand any reduction of the tariff, and if there was it would seriously affect the trade here. The ivory and pearl lines are closely associated with the jewelry, silverware and metal novelty lines, as the manufacturers use these in large quantities. As to the manufacture of brushes, largely used by these trades, the duty should not be lowered, as this industry could not stand against the cheap labor of Europe and Japan.

If cheap jewelry, German silver goods, metal novelties and other lines were affected it would damage the plating and all allied trades, which is a strong factor in industrial cities. This would include enameling, engraving, engine cutting, stone setting, casters, modelers, metal spinning, ornaments, die cutting, designing, chasers, buffing, findings and other trades involved. Wages are very low in the mesh bag trade of Europe, and come in strong competition with American made. The gold or sterling silver mesh bags would not be affected so much, but the silver plated and German silver bags would. In lorgnettes the high-grade lines could stand competition, but not so the gunmetal or silver. The more labor there is on an article the more fear of the cheap European labor. During Cleveland's administration the silver deposit work of Newark was ruined. The same applies to cutlery lines, which could not compete at all if the duty was lowered. In the optical lines high-grade goods can compete with the European make, but if the tariff was lowered the high and cheap grades would be affected, the latter the most, however. We export considerable of the high-grade optical lines.

The makers of bronze statues, busts and advertising novelties would not be affected as badly as some other lines, although considerable is imported. An effort is being made to organize the jewelry and silversmith workers of this city. They have never been organized to any great extent.



NEW BOOKS

"THE PRODUCTION OF ALUMINUM AND ITS INDUSTRIAL USE." By Adolphe Minet, Officer of Public Instruction and Editor of "L'Electrochimie." Translated with Additions by Leonard Waldo, S. D. First Edition, Corrected, First Thousand. Size, 5¼ by 7 inches. 266 pages and 57 illustrations. Bound in cloth. Published by John Wiley & Sons, New York, 1910. Price, $2.50. For Sale by THE METAL INDUSTRY.

The present work comprises a principal part, which is a literal translation of the German edition "Die Gewinnung des Aluminiums und dessen Bedeutung für Handel und Industrie," published in 1902, and an appendix including two wholly new chapters: the first, by the author, is devoted to a supplementary consideration of those parts of the German edition which have been made the subject of criticism. In the second chapter, Dr. Waldo describes the developments in the aluminum industry of recent years, more especially in the United States.

"AMERICAN MACHINIST GRINDING BOOK." By Fred H. Colvin and Frank A. Stanley, Associate Editors of the American Machinist. Size, 6½ by 9¼ inches. 383 pages, 286 illustrations and 36 tables. Bound in cloth. Published by the McGraw-Hill Book Company, New York. Price, $3.00. For Sale by THE METAL INDUSTRY.

This work, which will prove to be a valuable one to the art of grinding metals and the finishing of metal parts in general, has been compiled mainly from material which has been published in the pages of the American Machinist, such articles having been prepared by the best known authorities upon the subject of grinding. Valuable assistance has also been received by the authors of the work from various machine and wheel makers, who have supplied them with data pertaining to the different phases of the subject. From the character of the material appearing in the book, it will be seen that the work can be taken as expert authority on the subject of the operation of grinding and grinding machinery.

SICKNESSES OF ALUMINUM

To the Editor of The Metal Industry:

Some publicity has recently* been given to matter bearing upon the above subject, and we think that in view of the possibility of such communications being misunderstood, it would be desirable for us to state the case from the standpoint afforded by our own experience. The substance of a recent report by one of the official German testing laboratories was that when aluminum vessels were used for ordinary tap water or saline solutions two kinds of corrosion took place:

(a) A harmless oxidation over the whole surface.

(b) A destructive local action appearing in the form of spots and streaks.

The action (a) may be dismissed in a few words. Every metal (with perhaps the exception of platinum) undergoes some surface alterations which are in some instances destructive (e. g., iron rust), and in others quite the reverse. It may safely be said that aluminum falls under the latter heading, and the oxidation is really a protective action.

The local spots and spills designated (b), however, are wholly due to defects in manufacture, and apply to material which should never come into the market. We must emphatically protest against the assumption that aluminum in general is liable to these defects; it is, however, an unfortunate fact that all manufacturers do not take the same care over their product, consequently faulty material finds its way into the market to the detriment of the reputation of the metal generally.

Experience has demonstrated that aluminum can now be produced in quantity free from all of its earlier ailments. Care has to be exercised in its manufacture, however, and there is no justification for ascribing the failings of the manufacturer to the inherent properties of the metal.

British Aluminum Company, Ltd.,
London, November, 1912. Arthur Jacob.

*The Metal Industry, May, 1912.

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY

ALLOYING

Q.—Please furnish me with a mixture for core sand for compression cocks and plumbers' supply work. At present I am using 4 wheelbarrows of old core sand to one of white sand, and add 4 pints of granulated core glue dissolved in 8 gallons of warm water. The trouble is that if the sand is worked a little dry the cores are soft, and if wet, they are hard.

A.—Your core sand mixture contains too much old core sand. Try the following:

White sand	2
Old molding sand	1

Use the glue water and the method of mixing that you used before.—J. L. J.

Q.—Do you know of any metal that can be treated in any manner so as to maintain a vacuum? We understand that there is now on the market such a metal, known as "meteorite."

A.—"Meteorite" is an alloy of aluminum and phosphorus, invented by Walter Reubel of Germany. The name of the American agent will be furnished upon application to this office. The chief objection to the use of aluminum alloys for valves and fittings is the fact that they are never free from particles of oxide (alumina) which causes leaks and such an alloy would not maintain a vacuum. Whether Meteorite is so perfectly deoxidized as to overcome this objection is questionable. If used in sheet form for stamping, difficulty would no doubt be had in soldering it.—J. L. J.

BRONZING

Q.—I would like to know the process and the material which is used in giving the bronze finish similar to those which are imported.

A.—To produce the high-grade finish as applied to the French, Austrian and German bronzes, an experienced man, known as a French bronzer, would be required. The method of finishing these articles is to apply the usual methods of polishing to produce a smooth surface and then brass or copper plate the surface, if either of these metals is to show through the pigments to be applied later. However, it is good practice to give a deposit of copper to the figures and afterwards darken them with liver of sulphur dips, as this gives a better clinging surface for the colors. The pigments used are known as French bronze colors and bronzes. The names of importers of these materials, also of the varnish used in applying them, may be obtained by writing to this office.—C. H. P.

CASTING

Q.—In casting bronze bearings, 1¼ by 12 by ½ inch core, we have experienced difficulty due to the core sagging in the center, throwing the bearing out of line. Can you advise us what to do in order to overcome this trouble? We have been using our core sand 1 to 40 with 3-16 inch wires. The difficulty is in producing a bearing of equal diameter through its entire length.

A.—This bearing could be cast in a vertical position and gated at the bottom. The gate could be made in several steps, so the metal would not cut the sand at the bottom of the gate.—J. L. J.

CLEANING

Q.—Can you tell us whether the discoloration of the enclosed hinge is caused through careless plating or whether anything may have come in contact with it since leaving the hands of the plater?

A.—The discoloration is due to imperfect cleaning of the surface of the articles previous to plating. We are under the impression that the ends of the small spring have been soft soldered to the hinge. As a flux chloride of zinc is used, and after soldering a portion of the zinc flux remains upon the surface. Unless this is perfectly cleansed from the surface the articles will show the discoloration as noted, which is beneath the surface of the deposit. The cleansing of such small articles should prove a simple operation, merely immersing in muriatic acid for a moment or two to reduce the oxide of zinc formed in soldering, and then tumbling in a 5 per cent. solution of sodium carbonate and water for ten or fifteen minutes. This does away with manual labor and a ton could be easily cleansed in a day at very little expense.—C. H. P.

COLORING

Q.—My cold gold solution plates dark and dull. Can you tell me how to obtain a bright yellow color?

A.—If possible boil your solution for awhile and replace the water lost by evaporation; then add ½ ounce of bisulphite of soda to each gallon of solution. You apparently have too little gold in solution in proportion to the cyanide used. Gold solutions that are low in gold and high in free cyanide will not give a good rich tone, but as you note in operation produce a hard, dull color. The above suggestion may overcome your trouble; if not, it will be necessary to add more gold. The bisulphite of soda is at all times a good addition to gold baths, so may be used with entire confidence.—C. H. P.

DIPPING

Q.—Will you please publish a formula for a black dip on brass, one that will hold its color?

A.—The ammonia carbonate of copper is the only satisfactory dip for a black finish by immersion; other dips containing arsenic do not produce a black surface, but grayish tones. If your black nickel is properly regulated and sufficiently large you can accomplish quicker results than by immersion, unless the articles are very small. In such a case the ammonia copper dip, properly prepared, would give you quicker and cheaper results. Formula for the ammonia copper dip was published on page 312 of the July, 1911, issue of THE METAL INDUSTRY.—C. H. P.

DEPOSITING

Q.—Please inform me how the figured silver plating is done on glassware.

A.—We presume you refer to silver deposit ware, upon which subject very little has ever been printed. We do not know of a text book that takes up this matter in a practical manner, but, briefly stated, the process is as follows:

First: The glass, porcelain or china articles are cleansed in solutions of soda and thoroughly dried; then the design is painted upon the surface of the articles. The paint consists of very finely divided silver powder mixed with borate of lead as a flux, and then ground in Dresden thick oil and diluted for use with pure spirits of turpentine. After the design is applied it should stand for several hours and is then fired. This method is the same as used when burning-in colors in china. It consists of a retort, usually heated with gas and lined with asbestos. When the glass almost reaches the fusing point the silver, melting at a lower temperature, becomes impregnated in the glass and gives the metallized surface for plating.

Second: The firing is the most important part of the whole process and requires experience, especially in cooling, to prevent cracking of the glass. Afterwards the silver surface is lightly scratch brushed; then immersed in a cyanide dip and plated in a regular silver bath. This bath should contain not less than four ounces of metallic silver to each gallon, with only sufficient cyanide to give a proper reduction of metal from the anodes. For a heavy deposit the articles are usually plated from eight to ten hours, but for cheaper grades of work the time of immersion is only half as long. The usual polishing, gilding or oxidizing can be applied afterwards to produce any effect required.—C. H. P.

MEDICAL

Q.—Brass foundry burns. What is the best remedy or preparation to use in emergency when an employee in the foundry is burned by molten metal?

A.—When an employee is burned by molten brass, the wound should be washed with a warm solution of a mixture of 50 parts of water containing 2 per cent. of carbolic acid and 50 parts of a strong solution of sodium carbonate. After the pain has subsided a bandage should be applied, saturated with a mixture of 80 per cent. of strong lime water and 20 per cent. of boiled linseed oil. After the blister that forms has been broken or has been reduced, the burn should be dressed with hydrogen peroxide, diluted with one-half water, and the wounds will heal rapidly. If the burn is serious call a physician. Pending his arrival apply the carbolic acid and soda solution to the burnt parts as gently as possible, and leave the rest of the treatment to the doctor.—P. W. B.

PLATING

Q.—Please publish a good formula for a silver solution; also a brass solution for barrel plating.

A.—In preparing a silver solution the amount of silver used can be varied considerably and still give good results. From one-half to six ounces of metallic silver to a gallon is commonly used. We would suggest a solution consisting of

Chloride of Silver	3 ozs.
Potassium Cyanide, 98 per cent.	6 ozs.

To every one hundred gallons of solution dissolve one-half ounce of carbon bisulphide and eight ounces of cyanide of potassium in one pint of warm water and add to the bath.

For brass plating by the barrel method, the solution should have a density of 16 to 20 degrees Baumé, with a voltage of not less than 8. The following formula should give good results:

Water	1 gal.
Cyanide of Potassium or Sodium	1 lb.
Carbonate of Copper	6 ozs.
Carbonate of Zinc	3 ozs.
Sodium Bisulphite	3 ozs.

If the color does not come up uniformly, add one-quarter to one-half ounce of 26 per cent. ammonia to each gallon or solution. If the deposit is not sufficiently bright, dissolve two ounces of powdered white arsenic in four ounces of caustic soda and one pint of water. Add one ounce of the mixture to every fifty gallons of solution.—C. H. P.

POWDERING

Q.—Please publish in THE METAL INDUSTRY the most economical way of making lead, zinc and tin powders.

A.—Probably the most efficient method of making lead, tin or zinc powders is by means of compressed air, spraying after the plans of Schoop. This method is described in French patent 441,100, March 8, 1912.—J. L. J.

REFINING

Q.—How can I refine 14-karet cyanide gold solution, and would it pay me at the rate of three solutions weekly?

A.—Your profits in refining metals would be small unless it was done in your spare time. The time consumed and the value you place upon your time would determine whether it would pay you. The recovery of gold, briefly stated, consists of concentrating the solutions by boiling; then precipitate the gold and copper as cyanides by the addition of dilute hydrochloric acid, being careful to avoid an excess. The precipitate is allowed to settle and the clear solution poured off and the precipitate washed and dried. It is then mixed with sodium carbonate and a little potassium nitrate and fused in a glazed crucible. A good red heat must be obtained to completely fuse the metal. The gold and copper will be found as a bead or small ingot after cooling. To obtain pure gold, the copper or silver, used as an alloy, will have to be removed by nitric acid; the gold being unaffected, remains as metallic gold in the solution. The melting temperature of gold is 1065 degrees Centigrade.—C. H. P.

SOLDERING

Q.—Can you give us a good formula for an aluminum solder?

A.—The most satisfactory solder for aluminum can be made from the following materials:

Tin	29
Zinc	11
Aluminum	1
Phosphor tin	1

This solder can be used with the soldering iron.—J. L. J.

STAMPING

Q.—Could you advise me through the columns of your paper on the following: I have in operation two drop hammers, each weighing approximately one ton. To these are cast soft metal dies, which average in weight about 500 lbs., making the total weight of each hammer about 2,500 lbs. They drop from two to three feet on to an iron anvil of about five tons weight. This anvil is set on wooden piles composed of 8″x8″ x4′0″ Oregon timber, standing on end and bolted together. These piles stand on a foundation composed of 12″ concrete. The two hammers are about 3′ between the anvils. The trouble is that when the hammers are working considerable vibration is set up. Could you advise me in what way I could minimize or do away with the vibration, and at the same time preserve the solidity necessary to insure a solid blow on the anvil?

A.—The trouble with the drop hammers is that the anvils are too light in weight. The proper proportion of anvil to weight of hammer should be ten of anvil to one of hammer, whereas, in this case it is but four to one. The only remedy is to attach sub-bases of iron to the anvils, bringing the weight up to not less than 12½ tons each anvil. Care should be taken in machining these parts to see that they are well fitted and bolted together, making them practicably same as solid anvils. Then the foundations, if made of timbers, set on end, should be longer—say six to eight feet—and the sub-foundation, of concrete, should be thicker—say not less than 30″. All this is fully explained in an article by George W. Peck in THE METAL INDUSTRY, January, 1911 and 1912.—P.

VENTING

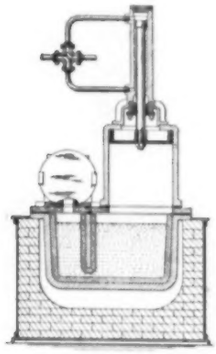
Q.—We are having considerable trouble on the bodies of our brass valves in the smaller sizes blowing in seat of same. Our loss in foundry is high. On our larger sizes we do not have that same trouble. Have changed the gating but get same results.

A.—The cause of this trouble is in your cores, which are not vented correctly. Take your core boxes and have a 1/32-inch hole put in the bottom of box or belly of the core. Run a vent wire right up through it to meet the vent on cap or bonnet end of valve. This will overcome your trouble, as it will allow the gas to escape. —P. W. B.

PATENTS

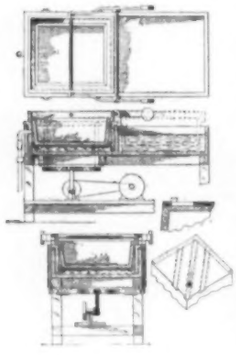
REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

1,039,173. September 24, 1912. Pressure Casting Apparatus. Albert Wood Morris, of Philadelphia, Pa., assignor to Wetherill Finished Castings Company, of Philadelphia, Pa.



This improvement in the art of pressure casting consists primarily in providing a cylinder, as shown in cut, in open communication with the air or other elastic fluids in the melting chamber above the molten metal, and a piston in that cylinder which is capable of producing, by its inward movement, a progressive increase of density of the air and a corresponding progressive increase of pressure, from low to high, upon the molten metal, thereby causing the molten metal to enter quietly, but promptly, through the uptake provided for the purpose, into the mold, filling it completely and subjecting it therein to the pressure necessary during cooling, setting and shrinkage to insure flawless and homogeneous castings.

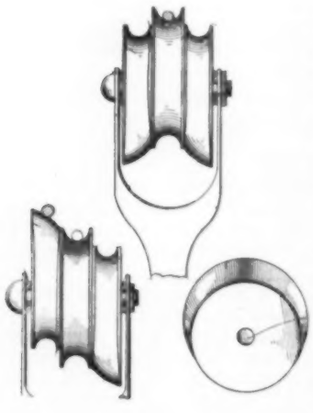
1,039,242. September 24, 1912. Machine for Etching Plates. Horace W. Baker, Dayton, Ohio.



This invention relates to improvements in etching machines. The object of the invention is to provide means whereby the plate to be etched is reciprocated in the body of solution at right angles to the face of the plate, thus preventing, to a great extent, the acid eating under the lines which form the image or design on the plate. Another object of the invention is to provide a machine, as shown in cut, which effects a great saving of time in etching to the requisite depth. And a still further object is to provide a machine in which the plate may be turned with the face of the etching up, either over the acid tank or wash tank.

1,039,589. September 24, 1912. Trolley Wheel. John W. Pennell, Youngstown, Ohio.

This invention relates to trolley wheels, and the principal object thereof is to provide a device which will return the wire to the wheel when it slips off. It is also desired to prevent any danger of the wire becoming jammed between the outside wheels and the central wheel. The wheel shown in cut is covered by the following claim:



The combination with a trolley wheel of a replacing wheel on each side thereof, mounted on a common axis, said replacing wheels having the same diameter as the trolley wheel, each being mounted eccentrically on the axis, each of said replacing wheels having a peripheral groove extending from the median line at the short side thereof and merging at the longer side into the face adjacent the trolley wheel, at a point flush with the periphery of the latter.

1,040,027. October 1, 1912. Alloy of Copper and Zinc. Alfred Schmid, Zürich, Switzerland.

The invention relates to an alloy of copper and zinc having 56-62 per cent. copper, to which, as an exclusive adjunct, silicon and tin are added. A metal is then obtained, which, in a raw cast condition, combines all properties of most value in practice, viz., high limit of elasticity, toughness, small liability to formation of hollow spaces, and, to separation when solidifying in the mold, high resistance to the attack of salt solutions (sea water), diluted acids, and alkalis, and no undue resistance to the action of cutting tools. Such alloys having 56-62 per cent. copper, 43.3-35.0 per cent. zinc, 0.2-1.5 per cent. silicon and 0.5-1.5 per cent. tin have, in a raw cast condition, limits of elasticity of 12.7 to 19 tons per square inch, a tensile strength of 30.5 to 34.9 tons per square inch, extensions of 25-35 per cent., and a high resistance to the notch bending test. When becoming solid there is only a very slight tendency to the formation of hollow spaces and no separation even in the case of large castings. In acids, salt solutions, and alkalis they are very durable. In spite of their high degree of toughness they can be easily shaped, planed, filed, turned, etc., and when red hot, they can be wrought, rolled and pressed, and, at a normal temperature, drawn, rolled and hammered. This is a result which is not obtained by any ordinary or special brass.

1,041,790. October 22, 1912. Process for Electrolytic Cleansing. Arthur Herrmann, Leipzig, Germany.

This invention refers to an electrolytic cleansing of metal products, by which such products are to be prepared for electroplating. More especially the improved cleansing process is adapted for preparing steel or iron wire, iron tape, sheet iron, wire netting, chains, etc., for galvanization in electrolytic baths or in baths of molten zinc.

The process comprises electrically connecting the article that is to be cleansed so as to make it form an anode and to draw it continuously through an alkaline or neutral solution at a very high speed using at the same time very high current densities. By increasing the speed of travel of the steel or iron wire sheet or band, and also increasing the current density, it is found that it is possible to obtain perfect cleansing, though only a very short length of the metal is under treatment at any given time, and this again permits a considerable reduction of the distance between the electrodes. By this means the high current densities required are produced, though the potential employed may be hardly higher than what was usual in the processes hitherto practised.

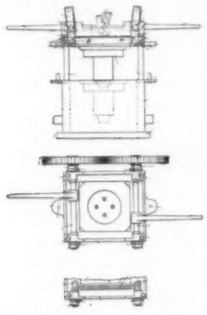
1,042,315. October 22, 1912. Process of Recovering Zinc from Galvanized-Iron Articles. Eduard Broemme, of St. Petersburg, Russia, and Rudolf Steinau, of Nuremberg, Germany.

The recovery of zinc from galvanized iron scrap, in particular pieces of galvanized sheet, wires, nails and the like of an average percentage of 6-9 per cent. of zinc by chlorination-roasting with common salt is not only incomplete, but also impractical, as large quantities of iron and manganese are dissolved, which can be removed by an expensive treatment only. The present invention consists in that the iron scrap from which the zinc is to be recovered is treated in the presence of much water with quantities equivalent to the zinc of a mixture of alkali bisulfate and of a chlorid of a metal whose hydroxid has an alkaline reaction, such as alkali or earth alkali metals. This treatment may be carried out at ordinary temperature or for accelerating the reaction at boiling temperature or under steam pressure.

Example: 100 kilos of galvanized iron scrap of 9 per cent.

zinc is boiled with a solution of 20 kilos of sodium bisulfate and 20 kilos of common salt, until all zinc has gone into solution. A very pure solution of zinc chlorid, sodium sulfate and sodium chlorid containing traces only of iron and manganese will be obtained, which can be used for the production of lithophone.

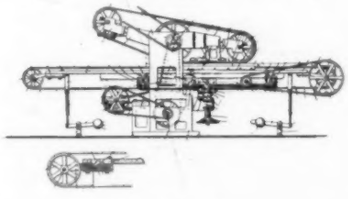
1,042,780. October 29, 1912. MECHANISM FOR DRAWING PATTERNS FROM MOLDS. B. D. Finler, J. B. Reilly and T. A. Reilly, Cleveland, Ohio, assignors to the Osborne Manufacturing Company, Cleveland, Ohio.



The present invention relates in general to mechanisms for drawing patterns from molds, and its particular object is the provision of a mechanism, as shown in cut, which may be used for drawing the pattern from a mold after it has been manually turned over; that is from a mold which has been turned over by some means in contradistinction to a roll-over or rock-over molding machine, some kind of drawing mechanism being ordinarily directly incorporated in machines of this type. The machine is covered by the following claim: the combination with a flask and a pattern-plate co-operating therewith; of a member provided on its under side with vertical rods designed to rest on said flask and when so resting to slidably hold said plate; rotatable shafts mounted at opposite sides of said member; cranks secured to the respective shafts; links pivoted to the respective cranks adapted to detachably engage said plate; and means for correlating rotation of said shafts.

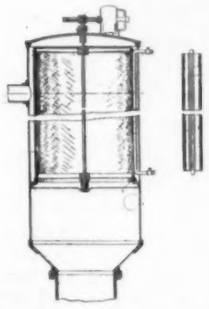
1,043,194. November 5, 1912. GRINDING AND POLISHING MACHINE. John C. Blevney, Newark, N. J.

The present invention has for its principal object to provide an efficient apparatus for grinding and polishing objects having, as shown in cut, two or more flat surfaces, such for example as square, or other polygonally-shaped rods or tubing; and it is the purpose of the machine to provide such objects with a smooth, uniform, and highly finished surface, free from blemishes, burns, or buckling appearance. In addition to this object, the present invention provides a quick and efficient means for handling and controlling the movements of the objects to be ground or polished, so that the same may be properly and completely treated by the grinding and polishing elements of the machine.



1,043,551. November 5, 1912. DUST COLLECTOR. C. R. Thurman, Pittsburgh, Pa., assignor to Electric Renovator Company, Pittsburgh, Pa.

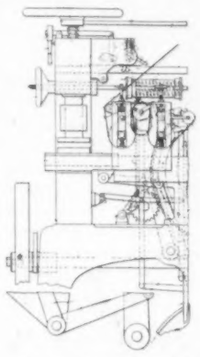
This invention relates to dust collectors for use with pneumatic cleaning systems and machines, particularly such as operate by vacuum or suction.



The object of the invention is to provide a receptacle, as shown in cut, of suitable form and dimensions into which dust laden air is drawn tangentially to give it a whirling motion and thus set up a centrifugal separation of the heavier parts of the dust and dirt from the air. Leaving the receptacle through a suitable outlet, the air traverses a screen of textile material and is thoroughly strained, the dust remaining more or less on the wall of the screen from which it is removed by causing a current of air to pass through the screen in a reverse direction. To accomplish this the screen is preferably made in the form of a cylinder and rotated slowly past a suitably arranged inlet communicating with the atmosphere. As the screen slowly traverses this inlet, the suction of the apparatus draws the outer air inwardly through the same which then passes through the screen from without and blows the dust from its inner side.

1,043,362. November 5, 1912. DIE-STAMPING PRESS. E. M. Savory, Bristol, and A. F. Battey, of Wimbledon, England.

This invention relates to die stamping presses of the kind wherein the power is applied suddenly by a spring-pressed arm which is controlled and released by a stepped cam. The object of this invention is to provide an improved apparatus of this kind. In apparatus made in accordance with this invention, as shown in cut, the screw and operating levers are so connected by a link adapted to transmit a thrust and pull that the rebound of the upper die may be caught and absorbed by the power spring. Means are also provided for the purpose of preventing a second or false stroke due to the rebound by means of a one direction clutch mechanism adapted to come into operation when the upper die and screw makes a partial upward stroke. Means are also provided for keeping the inking table in contact with the inking brush for a longer period than if the ink table were attached to the lower die holder. Means are also provided to prevent the delivery of a blow without stopping the machine.

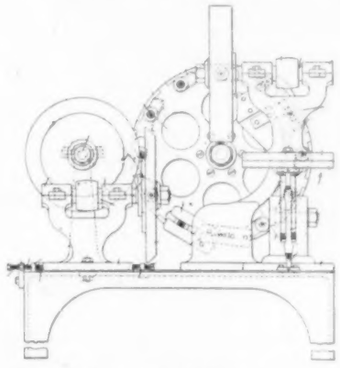


1,043,578. November 5, 1912. COMPOUND METAL BODY AND PROCESS OF MAKING THE SAME. B. E. Eldred, Bronxville, N. Y. Assignor to Commercial Research Company, N. Y.

This invention relates to articles of iron or steel or the like weld-united to metals of extremely high melting point, such as platinum, iridium, etc., and in the process of producing the same. According to this invention there is brought close together a body of platinum or the like of suitable size and shape, and a body of iron, steel or the like of suitable size and shape, and provided with an inseparably-united coating of this type, such coating being of copper, silver, gold, etc., and provide in the space between such platinum service and such surface of copper, silver, etc., a molten body of such a high melting metal as gold, copper or silver, which is capable of uniting readily, while in the molten state, with both the platinum and the coating metal. The apparatus used is as shown in cut.

1,043,973. November 12, 1912. POLISHING MACHINE. T. H. Schesch, Ilion, N. Y. Assignor to Union Typewriter Company, Jersey City, N. J.

This invention relates to a machine capable of use for a variety of purposes, but devised more particularly for polishing small articles, such as screws, and the main object of the invention is to provide simple and efficient automatic means for polishing small articles such, for instance, as screws.



Heretofore it has been customary to polish screws or screw heads separately by hand preparatory to nickel plating, bluing, etc., said screws. The machine of the present invention was devised more particularly to provide automatic means, as shown in cut, for polishing screws or screw heads quickly and efficiently so that the screws need not be handled from the time they are introduced into the machine, the screws being automatically discharged from the machine completely polished on all sides.

INDUSTRIAL

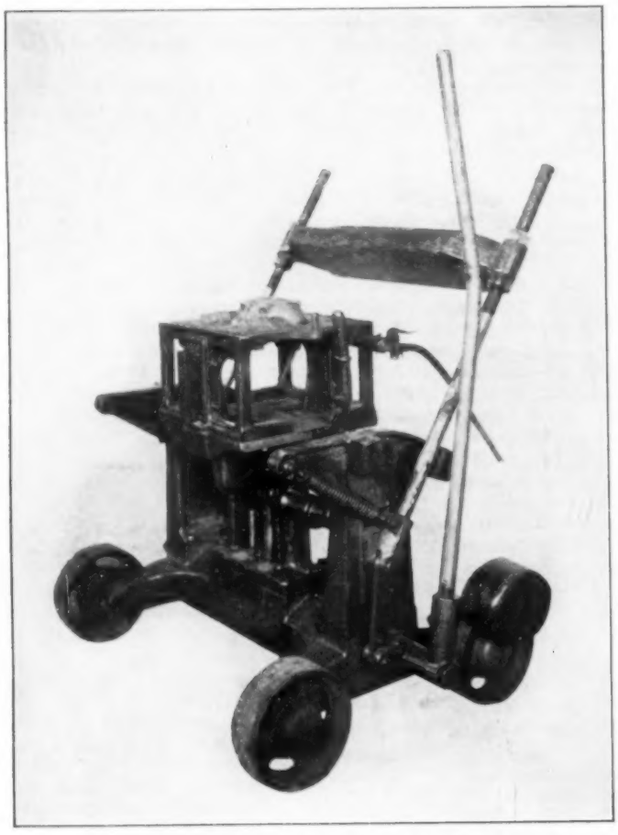
NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

SOME NEW PRODUCTS OF THE OSBORN MANUFACTURING COMPANY

DIRECT-DRAW ROLL-OVER JOLTER.

Among new molding machines which have recently been put upon the market is the Direct-Draw Roll-Over Jolt, manufactured by the Osborn Manufacturing Company, of Cleveland and New York. This is a very interesting machine, inasmuch as it combines power-ramming with a power-draw of the pattern and a means of rolling over the flask by hand. It also covers a double field of usefulness, as it is designed for the molding of small deep castings as well as the making of cores. The machine has been tested out by three years' service in the plant of the largest makers of automobile castings and marine gas engines in the world, and has gone far beyond the experimental stage.

The trunnions supporting the flask or core-box can be quickly



DIRECT-DRAW-ROLL-OVER JOLTING MACHINE.

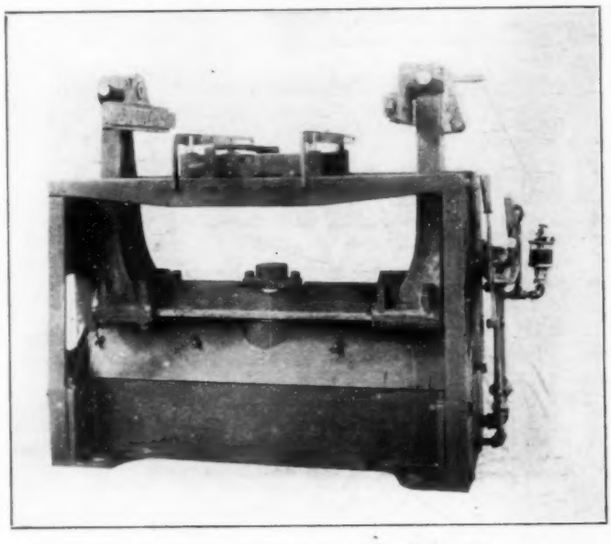
adjusted to flasks from 10 to 30 inches outside length and any width up to 24 inches. The maximum pattern draw is 10 inches. One cylinder is used for both jolting the mold and drawing the pattern. The mold is easily rolled over by hand, as it revolves on an axis passing near its center of gravity. While drawing, the mold is held in perfect alignment with the pattern by a simple locking device. One man can handle big core-boxes easily and accurately. The table is equipped with the Osborn Automatic Four-Pin Leveling Device, which perfectly accounts for all unevenness of bottom board. One lever locks all four pins in one operation. The flask does not rest directly upon the pins, but upon two sliding steel arms which pass through slots in the pins. Thus after the pattern is drawn the arms carrying the flask can be drawn out clear of the mould. In addition to the size illustrated herewith, the Osborn Direct-Draw Roll-Over Jolt is made in larger sizes for heavier work.

The easy roll-over and the direct accurate draw of the pattern make this the most efficient machine yet designed for the small deep castings used in automobile and similar work. The various sizes of the machine are used with great success for making piston-rings, pistons, cylinders, crank-cases, fly-wheels, brake-drums, crank-case cores, jacket-cores, etc. In short, it is equally valuable in the core-room or foundry. It is simple and durable in construction and accurate in operation. It means economy of time and labor and increased quantity and quality of work. The machine was first put upon the market at the recent Convention for Foundrymen, at Buffalo, and was one of the features at the Osborn exhibit which attracted the most attention.

DROP-PLATE SQUEEZER.

Recent changes in this Osborn machine have made it even more efficient than in the past and extended its already wide range of usefulness. It will be noted by the illustration the strong and substantial construction of this machine, as well as the fact that it is a combination of three separate types, and in addition has the advantages of a wheel base if desired.

It possesses a very powerful leverage, and when not used as a squeezer it can be used as an adjustable drop-plate flask stripper, adjustable to a large range of flask sizes and having a true, accurate draw of pattern of six inches. This obviates consid-



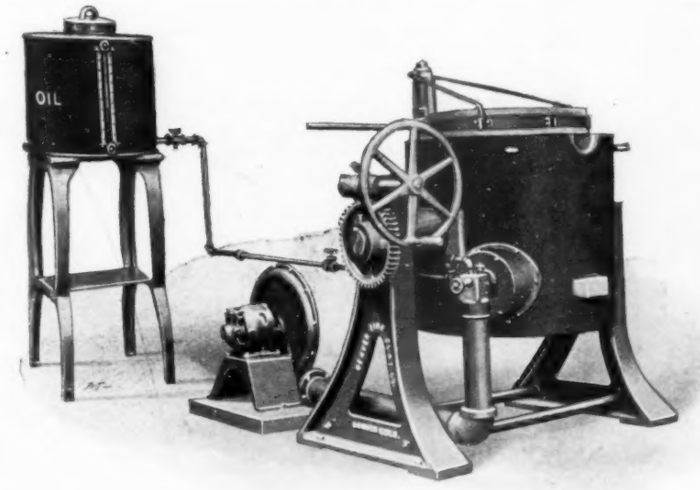
THE OSBORN DROP-PLATE SQUEEZER.

erable expense for stripping plates, inasmuch as many such jobs can be handled on this machine on plain plates which strip directly from the flask. However, this machine is a stripping plate machine as well as a flask stripper. In fact, the makers claim there is no more accurate machine on the market for this class of work. All in all it should be one of the most convenient and handy machines to have about the foundry, as it can be used for so many different classes of work, and has the further advantage of being moved about from place to place on the stout wheels which are so made as to obviate all liability to clogging up with sand. The machine is manufactured by the Osborn Manufacturing Company, of Cleveland and New York.

TILTING CRUCIBLE FURNACE

The tilting crucible furnace shown in the illustration is designed for the melting of brass, copper, aluminum, nickel and other foundry metals, and is manufactured by the Denver Fire Clay Company, Denver, Col. This furnace is equipped with a cover-lifting mechanism, which is claimed to be the simplest and most easily operated of any on the market and may be mounted either on the body of the furnace, in which case it remains on the furnace while tilting, or on the leg opposite the worm gear, where it does not cover the furnace while the latter is tilting. The crucible used in the Donaldson furnace is claimed to be of a design superior to that used in any other tilting furnace, and it is stated that its particular shape will prevent overcharging and slipping that is usually so disastrous to furnace linings. These crucibles are made by the Joseph Dixon Crucible Company, of Jersey City, N. J. The crucible is held in place by patented linings, which consist of refractory fire clay tile, easily and quickly replaced. The outer lining, on account of being protected by the inner linings, seldom needs renewing.

The essential differences between the Donaldson tilting furnaces and other makes are said by the manufacturers to lie in the burner linings and source of air supply. The type of fuel oil burner which is used requires fewer ounces of air pressure to thoroughly atomize the oil than other burners require pounds of air pressure. The face of the burner is placed almost touching the base of the furnace, no secondary air being used. The correct combination of air and oil is controlled to a nicety by the air and oil valves. With its low air pressure there is an almost total absence of noise; in fact, two people can converse beside a running furnace without raising their voices.



THE DONALDSON TILTING CRUCIBLE METAL MELTING FURNACE.

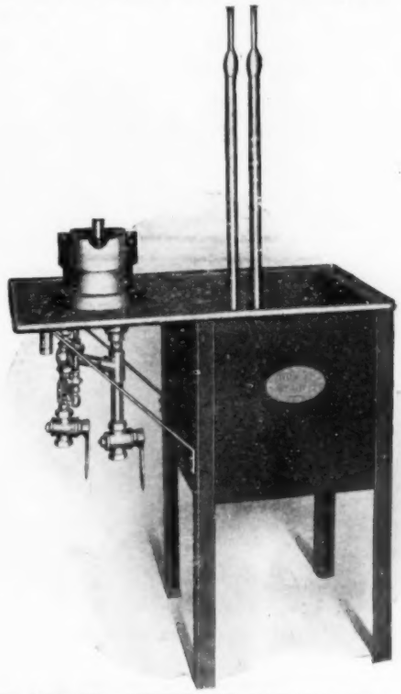
Some of the results of recent tests of the Donaldson furnace, made at a brass foundry, with cost of fuel oil based at eight cents per gallon, showed an oil consumption of two and one-half gallons per hour. The air for the furnace was furnished by a small fan, connected direct to a one-quarter horsepower motor, which gave an air pressure of six ounces. No. 60 crucibles were used, holding 165 pounds of melted brass, and 1,155 pounds of brass were melted in six hours and twenty minutes with a fuel cost per pound of brass melted of less than one-fifth of 1 per cent. Catalog "A," which tells the whole story, may be obtained upon request.

MOGUL

Mogul is an acid, water, rust, fume and damp-proof material manufactured by the Mogul Company, 429 Sixth avenue, New York. This material is claimed to be odorless, a quick dryer, a perfect insulator and preservative. Mogul is used for the coating of wood or metal work to protect the same against acid, alkali and fume effects in all places where such work is being carried on. Thus it will be seen that it has a particular application to the plating industry. It can be used as a protective covering for the floor, where acid is likely to be spilled. Also it is claimed that if a tank or receptacle is covered with Mogul it need not be made of heavy and expensive timber, strongly bolted, but instead can be constructed of inch material, white wood or white pine, or any wood that readily absorbs paint. The manufacturers state that they have made tanks 56 inches deep, holding two tons of liquid, from one and one-eighth inch material, put together with screws and not bolted, which has been worked for over a year without developing any leaks. Mogul may also be applied at a stop-off for use in etching. The Mogul people will be pleased to furnish literature and answer any questions regarding this material.

AUTOMATIC PICKLE FURNACE

H. J. Astle & Company, Providence, R. I., have just placed upon the market a line of Boland automatic boiling-out and pickle furnaces. One of these furnaces with its accompanying pickle tank is shown in the cut and has the following dimension: Size of tank, 16 by 16 by 14 inches deep; length over all, 32 inches; width, 17 inches; and height, 30 inches. As will be noted by referring to the picture, all valves and pipes are underneath the furnace which protects them from becoming covered with dirt or spilled pickle. The tanks and shelves are made of heavy sheet steel, while heavy sheet lead is used on the inside of the tank and the shelves. These furnaces are designed for use by manufacturing jewelers for boiling out soldered work, and boiling liquids in copper pans, kettles or pots. They may also be used for melting soft metals in ladles and are claimed to be cheaper than charcoal or other crude fuels.



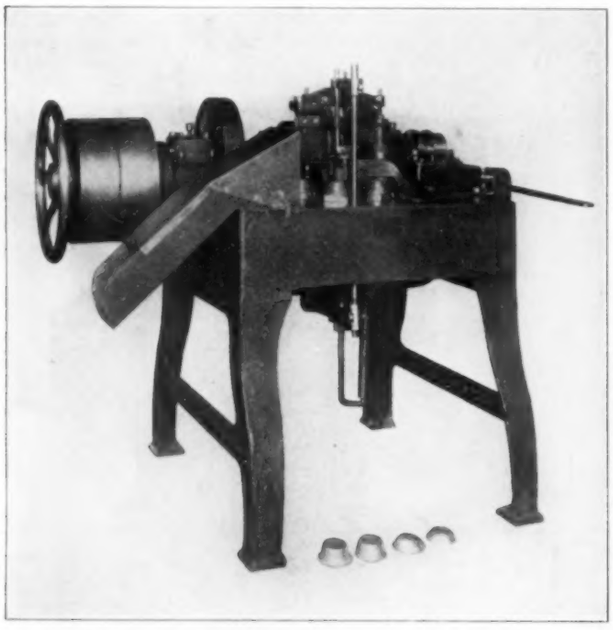
THE BOLAND AUTOMATIC BOILING-OUT AND PICKLE FURNACE.

The operation of the furnace is extremely simple. the pilot light is kept burning and the gas and blast are set to give the proper flame when in operation. When the pickle pan is placed on top of the shaft in the center of the furnace, the weight of the pan forces the shaft down and this opens the valve. When the pan is removed the shaft rises and the flow of gas is shut off. Further particulars and catalogs may be obtained by writing to the manufacturers.

AUTOMATIC TRIMMING AND CURLING MACHINE

A special machine recently designed and built by the E. W. Bliss Company, of Brooklyn, N. Y., for trimming and curling the flange of drawn cups is shown in the accompanying illustration. Samples of the work done are shown under the machine. The machine consists of a vertical turret with six spindles, each spindle carrying a chuck. The spindles are revolved continuously by spur gearing, and the turrets intermittently by a Geneva movement. The operator places a cup on the chuck as it appears in front of him, the chuck then moves in position for the trimming cutters; these consist of two rotary cutters mounted in a slide and driven by a chain and sprockets; the slide moves by cam action in toward the chuck trimming the flange of the cup, the scrap being discharged through the machine.

The curling of the edge is done at the next two positions, the first starting and the next finishing the edge; at all three positions, the blank is held on to the chuck by an upper



BLISS AUTOMATIC TRIMMING AND CURLING MACHINE.

spindle which descends on the clamps and the blank after it has been brought into position. The discharge of the blank is by means of two fingers mounted in a yoke and held by spring pressure against a stop and set to the diameter of the blank. The fingers descend on the cup gripping it at the edge and lifting it up until a third finger strikes it which throws it in a horizontal direction into the discharge chute. The machine is semi-automatic; the operator only places the cup on the chuck, the machine does the rest.

The capacity is about 30,000 in ten hours, and it will take shells either straight, taper or spherical up to 3 inches diameter by 1½ inches high.

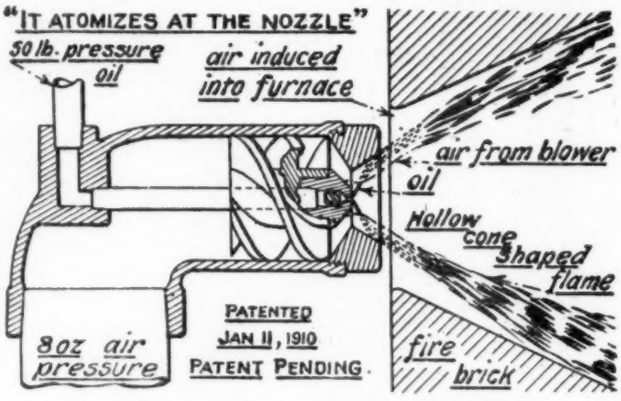
ALUMINTIN

This is a product being manufactured by the Hoyt Metal Company of St. Louis and New York and is sheet aluminum faced on both sides with pure block tin. This metal can be soldered and electro-plated readily and perfectly and has a specific gravity of 3.34. Among the many things claimed for this material by the manufacturers is that it is absolutely non-corrosive, stiff, strong, light and cheap compared with copper, german silver and block tin. As alumintin weighs only 38 per cent. of the weight of copper, in comparing the prices of these materials it is necessary to take the difference in weight into consideration, that is, the weight per square foot of any given thickness. Therefore, to compare the price of alumintin with sheet copper, it will be necessary to take 38 per cent. of the price quoted for alumintin in order to arrive at the correct comparison. This metal is rolled to and including No. 26 B & S Gauge and in width up to and including 24 inches. Further particulars may be obtained by corresponding with the above company.

STILZ OIL BURNER

This burner is said to be the only burner on the market which will atomize with low air pressure (8 ounces or more). A perfect mixture of air and atomized oil is produced with it right at the nozzle, the blower air being directed so as to penetrate the hollow cone-shaped film delivered from the oil nozzle, reducing it to a fog in passing through. This burner produces a soft flame right off the tip of the nozzle, the effect produced being similar to that obtained with gas through a Bunsen burner. The atomization is carried to an extremely high degree, and since it is accomplished principally by mechanical means, i. e., the spraying effect produced by the pressure on the oil itself, there need be no excess of air, that greatest of all destroyers of high efficiency.

A higher temperature, it is claimed, can be produced with this burner than with others, and with a reducing flame. The value of this will be appreciated in connection with brass melting furnaces where as much as 4 per cent. of the metal is oxidized in making a melt. The burner, moreover, produces its maximum temperature at the point of admission so that a crucible is subjected to its highest temperature at the bottom, whereas other burners require an abutment to check and diffuse the flame (the oil being merely blown into the furnace, and the heat within



PLAN VIEW OF THE STILZ FUEL OIL BURNER.

being relied upon to atomize it), so that the metal in the crucible is subjected to its highest degree of heat at the top in view of the retarded combustion. At a test at the More-Jones Brass and Metal Company, St. Louis, a 600-pound melt was made with but 4 pounds loss (brass). The very high efficiencies which have been produced with this burner are said to be unbelievable to any except those who have witnessed tests on it. This burner is manufactured by the Stilz Company, 1938 North Marvin street, Philadelphia, Pa.

WALDBERG COMPANY'S PRODUCTS

In addition to a stock of "Persels" nickle salts which Mr. Alexandre Waldberg, of Waldberg & Company, Paris, France, has brought with him to this country, Mr. Waldberg has demonstration samples of other products of his firm. These products include: A brass solution for depositing a heavy coat of brass on any metal in a short time. A zinc solution which deposits right. Three cleaning solutions which are as follows: 1, For cleaning and depositing simultaneously copper; 2, For cleaning and depositing brass; and 3, A special cleaning solution for Brittania metal which does not attack the base metal. Information may be secured and demonstrations arranged for by corresponding with Chemical Department, B. O. Bowers Company, temporary agents, 6 Harrison street, New York.

IMPROVED PUMP FOR TURNER TORCHES

The Turner Brass Works, Sycamore, Ill., have recently designed another improvement for their line of gasoline blow torches and furnaces which they consider the most important change in construction which they have yet made and is known as the Turner Improved Pump Cap and Former, fully covered by patents. The application and use of this improved pump cap in connection with the Turner tools is illustrated below and shows how easily the pump may be kept in good condition for the effective operation of the blow torch or furnace. The pump plunger can be removed from the pump cylinder, the leather washer oiled and softened and formed to correctly fit the inside of the pump cylinder and then reassembled in perfect condition.

Users of blow torches and furnaces are familiar with the common difficulty experienced in reinserting the leather pump washer into the pump cylinder of the ordinary blow torch without buckling or cutting the leather, making the pump unfit for use. This difficulty is entirely overcome in the Turner improved pump cap and former as applied to the Turner tools. A good pump is essential to a good blow torch or furnace, inasmuch as it is impossible to secure a hot blast flame from even the best constructed burner unless there is a strong air pressure in the tank produced from the action of the pump. It is essential therefore that the air pump be kept in perfect condition by frequently oiling and softening the leather pump washer, and this is made easy by this new Turner improvement. The manufacturers state that this new feature will be added to their entire line and

supplied to the trade before the end of the year. Other improvements of interest to the trade and original with these manufacturers added recently to their line of the old reliable, hot blast and double jet torches, etc., are their non-leaking filler plugs made with a specially prepared lead washer recessed into the metal, interchangeable steel soldering copper attachments for applying to the burner tube of the torch and packed with each appliance without additional charge, and a system of numbering their appliances which they have introduced to designate the symbol or type on the pump handle of the tool.

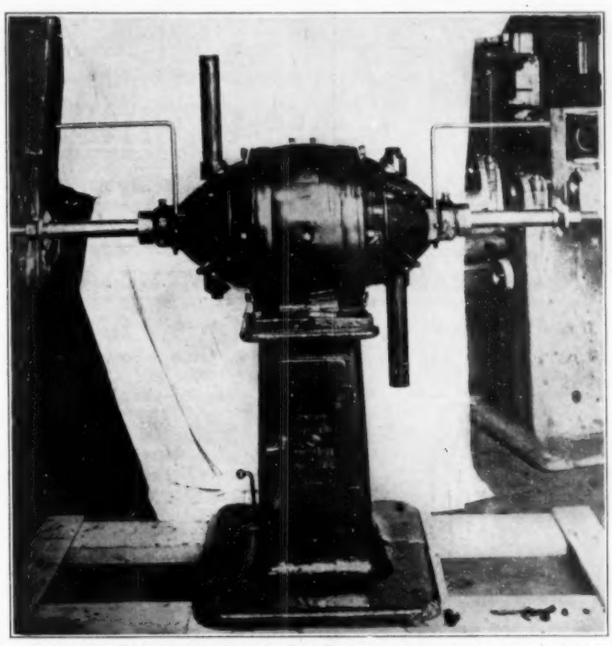
BOLTLESS INTERCHANGEABLE FLASK

The Tuohy Boltless Interchangeable Flask and Flask Bar, now being shown, can be so combined to make up and bar any size flask from twenty-four inches square upward, advancing in widths or lengths in steps of six inches. This is accomplished by employing flask sides and ends of varying lengths provided with suitable sockets, the system being rigidly held together by simple wedges. The bars are likewise secured by the double finger wedges. No bolts or rivets are employed and a common hammer is the only tool required to assemble the parts or to knock them down.

The flask and bars in place are as rigid as those in the bolted flask and positively will not shake loose under the most severe punishment. The bars can be raised or lowered in the flask to suit the pattern. They can be placed lengthwise or crosswise of the flask. Short bars can be inserted between the larger ones. In other words, the most complicated systems of barring for straight work for checking or chucking molds can be built up as fast as a man can move and drive in the wedges. All this is accomplished with the flask in place on the bottom board over the pattern. These flasks are made by John Tuohy, Pittsburgh, Contra Costa County, California.

AIR COOLED POLISHING MACHINE

The machine shown in the cut is an air-cooled motor-driven polishing machine manufactured by the Diamond Machine Company, makers of grinding and polishing machinery, Providence, R. I. This machine is built in four sizes, with 1½, 3, 4½ and 10 horsepower motors. In all cases the armature is wound on a quill so that the spindle can be readily removed and without interference to the motor, and in all cases the motor is air-cooled with bronze fans. Air is drawn in to the upper pipe, the lower pipe being an outlet. A fresh supply of air is therefore



DIAMOND MACHINE COMPANY AIR-COOLED MOTOR-DRIVEN POLISHING MACHINE.

always drawn through the machine, keeping it cool even under heavy polishing. Bearings are of ample dimensions, bronze, ring-oiling, self-aligning and dust proof. The column is unusually wide at floor, giving proper support with minimum vibration. Hand holes are provided in the cases to allow access to armature. All starting mechanism is placed inside the column, and machine can be controlled without opening column door, as switch and rheostat lever are projected through the column and can be manipulated by the operator with the least inconvenience.

FARREL FOUNDRY NEW OFFICE

The new office of the Farrel Foundry & Machine Company, Ansonia, Conn., is a large three-story T-shaped building, built of dark red selected brick with trim and underpinning of Warsaw bluestone. The roof is of unfading green slate, and the floors are of reinforced concrete, absolutely fireproof, finished in the corridors and toilet rooms with Wills-it sanitary flooring. The interior of the office is large and spacious, having seven rooms on the main floor beside a large vault and board of directors' room, while on the second floor there is a large vault for the filing of letters, and nine offices. All of these are equipped with new Derby desks, new telephones connecting all rooms through a central switchboard, individual desk lamps and electric call bells.

NEW OFFICE BUILDING OF THE FARREL FOUNDRY AND MACHINE COMPANY, ANSONIA, CONN.

To insure having a sanitary and healthy office there has been installed a system of direct and indirect heating, which is accomplished by means of a Mills cast iron sectional boiler with direct radiation and a plenum system of indirect heating. The fresh air comes in through an air-washing apparatus passing over tempering coils and through a Sturtevant fan, thence by ducts built into the wall, entering each office through a register in the upper part of the wall. The foul air passes out near the floor of the room and thence to the roof. The apparatus is capable of handling 6,500 cubic feet of fresh air per minute, so that by this combination of direct and indirect heating excellent ventilation is maintained at all times. To further insure a cleanly office a vacuum cleaning apparatus is installed in the basement with two outlets on each floor, and the windows are fitted with metal weather strips which prevent the entrance of dust and cold draughts.

In case a fire should ever occur, the building is equipped with standpipe and safety automatic reels and hose on each floor and in the basement. The interior finish is quartered oak and the stairways are of ornamental iron with dark green slate treads. Soft colors prevail throughout, the halls being finished in a terra cotta and the individual rooms in a light brown.

Associations and Societies

DIRECTORY OF AND REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

AMERICAN INSTITUTE OF METALS

President, L. W. Olson, Mansfield, Ohio; Secretary and Treasurer, W. M. Corse. All correspondence should be addressed to the Secretary, W. M. Corse, 106 Morris avenue, Buffalo, N. Y. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association in a succession of cities as invited. The next convention will be held at Chicago in October, 1913.

A meeting of the Joint Boards of the American Foundrymen's Association, the Associated Foundry Foremen, The American Institute of Metals and The Foundry and Machine Exhibition Company, was held at Chicago, on December 3, to select the time and place for the next convention. It was decided to hold the convention and exhibition for 1913 at Chicago, Ill., during the week of October 6.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS

President, Theo. Ahrens, Louisville, Ky.; Commissioner, William M. Webster. All correspondence should be addressed to the Commissioner, William M. Webster, 1112 Schiller Theater Building, Chicago, Ill. The objects of the Association are to promote in all lawful ways the interests of firms engaged in the manufacture of brass goods. Meets every three months. Each meeting fixes the place and date of the meeting to follow, consequently there is no stated place. It has been customary for the Association to hold its Annual Meeting in New York City in December.

As THE METAL INDUSTRY goes to press, this association is holding its annual meeting at the Hotel Astor, New York. The annual banquet was held on the evening of December 11, and an account of this event, together with a report of the proceedings of the meeting and the election of officers, will be published in our next issue.

ELECTRO-PLATERS' ASSOCIATION

President, Richard H. Sliter, Jersey City, N. J.; Recording Secretary, A. J. Stremel, Brooklyn, N. Y. All correspondence should be addressed to the Secretary-Treasurer, Royal F. Clark, 246 Fulton avenue, Jersey City, N. J. This is an educational society, the objects of which are to promote the dissemination of knowledge concerning the art of electro-deposition of metals in all its branches. Meets at Grand Opera House Building, 309 W. 23d street, New York, on the fourth Friday of each month, 8 p. m.

The regular monthly meeting of this association was held on November 22, with thirty-five members present. Two applications for active and one for associate membership were acted upon favorably. After the conclusion of the routine business, various subjects were discussed, some of which were "Dull Black Nickeling," "Black Nickel as a Ground for Silver Oxidizing," "Gilding of Screws Used for Optical Goods" and "The Application of Pigment Lacquers."

The November meeting of the Philadelphia Branch was held on the 30th, fifteen members being present, and delegates were elected to attend the reorganization meeting to be held in New York in February.

A banquet and entertainment for the members, their wives and sweethearts was held at Mosbach's Casino on Thanksgiving evening, at which twenty-eight couples were present. A very enjoyable dinner, the menu cards for which were furnished by the Egyptian Lacquer Company, of New York, was followed by the delightful entertainment of the evening, which included selections on the violin by Miss Edith Wells, accompanied by Mrs. Arthur B. Wells, on the piano by Fred C. Clement, Jr., and singing by Miss Caroline Link and Thomas Heuster. The banquet was opened by a neat little address by President Clement, who then called on each member for a three-minute talk. Dancing concluded the evening. The ladies were presented with silver bonbon dishes as compliments of the association and with silver chain purses by the Celluloid Zapon Company, of New York.

The National Electro-Platers' Association had been in existence but little more than a year when sufficient interest had been aroused to warrant the organization of a branch in Philadelphia. In the formation of this body, which first met on September 23, 1910, with an attendance of thirteen, no one took a more active part than Frederick C. Clement, who has been president of the branch ever since its inception.

Mr. Clement started in the plating business together with his father, who had been a close plater in France, with the Reyburn-Hunter Company, manufacturers of lightning rods, Philadelphia. Here the principal plating work was in gold, silver and platinum. Then Mr. Clement accepted a position with the Jackson & Sharp Company, of Wilmington, Del., where he stayed for three years. From here he went with the Harlan & Hollingsworth Company, also of Wilmington. After spending five years in the employ of this firm, Mr. Clement returned to Philadelphia as foreman plater for the Gideon Sibley Dental Instrument Company, which position he held for six years. His next position was another promotion, as he became manager of the plating plant of the John L. Gaumer Company, Philadelphia, where he remained for eight years, resigning to take his present position with the Victor Talking Machine Company of Camden, N. J. The polishing and plating departments of this company have just moved into a new six-story concrete building, where they occupy the sixth floor. Windows on all four sides and a skylight afford plenty of light, and together with the thoroughly modern equipment, make this one of the model finishing departments of the country.

As the Philadelphia branch of the N. E. P. A. numbers at the present time 68 members, it will be seen that the efforts of Mr. Clement and his co-workers, whose photos are shown below; James R. Moore, vice-president and foreman plater for the John Meadows Company, Philadelphia, for twenty years; Arthur B. Wells, treasurer and foreman plater for the Hartford Sterling Company, Philadelphia, and Joseph L. Dinan, Sr., recording secretary and foreman of the plating and polishing departments of the Sutterly Company, also of Philadelphia, have not been in vain, and THE METAL INDUSTRY offers these gentlemen its congratulations for the good work they have done and its best wishes for their success in the future.

F. C. CLEMENT, President. J. R. MOORE, Vice-President. A. B. WELLS, Treasurer. JOS. DINAN, SR., Secretary.

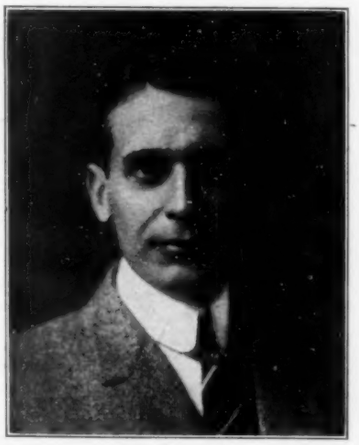
OFFICERS OF THE PHILADELPHIA BRANCH OF THE NATIONAL ELECTRO-PLATERS' ASSOCIATION.

PERS-O-NALS

ITEMS OF INTEREST TO THE INDIVIDUAL.

FRANKLIN S. COBB

Franklin S. Cobb has recently been elected to the office of president and general manager of the New Era Lustre Company, manufacturers of lacquers, New Haven, Conn. Mr. Cobb has been secretary and treasurer of the company since its incorporation in 1907. The new president has many friends among the users of lacquer who will be pleased to know of his new connection with the company, and his reputation as fair and square and his readiness to stand back of his goods will undoubtedly be the means of materially increasing the already large business done by his company. Mr. Cobb proposes to give his personal attention to the manufacture of lacquers at the factory in New Haven.



F. S. COBB.

J. H. Hansjosten, foreman plater for the Automatic Electric Company, of Chicago, has resigned his position to accept one as a salesman with the Bennett-O'Connell Company, also of Chicago.

W. H. Boynton has resigned his position as chemist for Joseph Fahys and Company, Sag Harbor, N. Y., and has accepted a similar position with the New Jersey Zinc Company, at Palmerston, Pa.

Charles M. Hall, vice-president of the Aluminum Company of America, and the inventor of the present method of producing aluminum, sailed on November 3 for the Bermudas, where he will spend the winter.

H. E. Willmore, formerly foreman plater for the Chicago Hardware Company, has accepted a position with the Acme Steel Goods Company, of Chicago, as superintendent of the plating and finishing departments.

At the annual meeting of the Light Manufacturing and Foundry Company, Pottstown, Pa., E. S. Fretz was re-elected president and general manager; Frank S. Brant, vice-president, and E. B. Casel, secretary and treasurer.

Victor C. Lassen, who recently resigned from the Victor Metals Company, as reported in the October issue of THE METAL INDUSTRY, is about to leave for a three months' trip to Europe, visiting foundries in England, Germany, Russia and Denmark.

Gus Creutz, who took charge of the Cleveland office of the Bennett-O'Connell Company on July 1 of this year, has been very

successful in looking after the trade and increasing business in that territory to almost double what it had been for the previous year.

Richard H. Sliter has resigned his position as foreman plater for the Edward Schroeder Lamp Works, Jersey City, N. J., and has become connected with the Celluloid Zapon Company, lacquer manufacturers of New York, in the capacity of salesman.

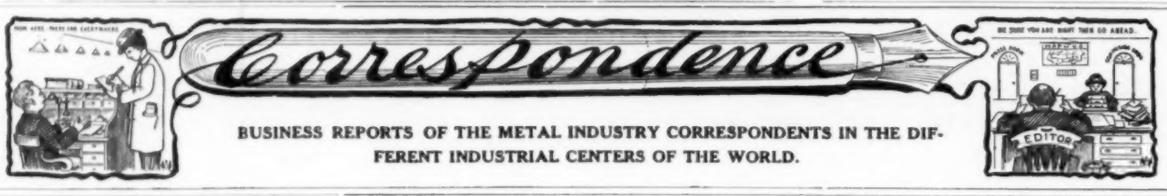
H. P. Houghton, at one time of the Bennett-O'Connell Company, of Chicago, and more recently in charge of their Cleveland office, is now associated with Chas. F. L'Hommedieu Company, of Chicago, as a salesman. Mr. Houghton was in the employ of the Bennett-O'Connell Company for fourteen years.

Alexandre Waldberg, of the firm of Waldberg & Company, 12-14 Rue Duret, Paris, France, manufacturers of and dealers in Persels plating salts and electroplating apparatus and supplies, is now in this country with the object in view of organizing an American company to manufacture and handle the Persels salts and other Waldberg products. Mr. Waldberg's address is the Hotel Knickerbocker, Broadway and Forty-second street, New York.

A. P. Hine, superintendent of the American Brass Company, Waterbury, Conn., has resigned his position, to take effect the first of the year, in order to have more time to devote to his personal affairs. Mr. Hine has seen forty-two years of continuous service with the Coe Brass Company and the American Brass Company, and no announcement has as yet been made of his successor as superintendent. In order to secure to the company the benefit of his long experience Mr. Hine has been tendered the position of advisory superintendent and consulting engineer, which he has accepted.

DEATH

Samuel H. Cramp, former president of the William Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa., died at his home in that city on November 8, in his seventy-ninth year. He was one of three sons of William Cramp, founder of the business, and was admitted to partnership in the firm in 1857. In 1897 he was made president and served in that capacity until 1907.



BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

DECEMBER 9, 1912

Election over, Thanksgiving past, and announcements of midwinter inventory recesses just coming along, mark the beginning of the end of a good year in the metal manufacturing business of this section of the country. Thanksgiving was an easy matter this year, for the manufacturers, at least, for the year had begun hesitatingly, worked along in "fits and starts" at times very jerkily, and continued dubious to the skeptical for the first four or five months. Then the pace became even and steady, and it has gone merrily forward since. Of course it is due to busy times in the factories that it has been thus, and the same conditions have put up the price of raw labor and made times good for the skilled mechanics of these parts with the solitary exception of the high price of food stuffs. But even the prices of food can be met, and if the margin left over was slight, there has been little grumbling. The Democrats have been elected and the prices are expected to tumble, of course eventually, so that times will continue good.

It has been a year of prosperity in practically all the factories of Waterbury and the towns of the Naugatuck valley of which Waterbury is the metropolis. From Derby to Winsted conditions have moved from good to better in about all lines, and new plants have been occupied, much repairing done and other external signs of prosperous business have been evident. It is the prayer of all now that the Democratic Congress may be so guided that it will continue. Even the war scare in Europe, bringing with it a tightening of money rates and a stoppage of business for other lines, has been instrumental in making business better here. Up in Torrington the brass manufacturers have had rush orders for large quantities of cartridge shells and similar goods consumed rapidly in warfare and the general demand of European nations for new and improved armaments in fear of a general struggle on the continent has undoubtedly helped many American mills.

The one bad break of the year hereabouts, the New England Watch Company's passage into a receiver's hands, does not appear so badly now. Franklin Taylor, formerly general manager of the Randolph-Clowes Company, now acting as the head of the New England Watch Company, has been successful in putting the company's business in much better shape than it has been for a long time. He has proved a great success as a salesman, and has done most of the selling for the company since taking the reins, leaving the management of the shop to the same corps which has been in charge for years. The factory will close for inventory December 21, remaining closed for nine days, including two Sundays and Christmas day, and reopening December 30. The factory has recently put on the market the smallest accurate watch in the world, and it has taken hold of the trade well. Orders for its cheaper grades of watches are being filled in large lots and continue to come in.

In the Waterbury Clock Company's shop equally prosperous conditions are reported from its watch department and lively business in its clock shops. The same may be said of the novelty factories, the Novelty Manufacturing Company, the Noera Manufacturing Company, and the Waterbury Manufacturing Company, and these have also experienced large benefits from the generous automobile manufacturing campaign for the coming year. It is estimated that the output of automobiles in America for 1913 will reach the 600,000 mark, or about double what the present year brought forth, something over 297,000. Brass and other metals produced here figure generously in their makeup. In the piano hardware, machine, tube, ring and wire branches of local industries conditions have been excellent.

Concerning the effect of the election little can be learned. On the surface it has caused no ripple, and orders are reported as showing only a very small falling off on next year's deliveries, so small that no alarm is caused by the fact. It is safe to say, however, that there will be no "plunging" on the strength or continued prospects of good times, for a great deal depends on the first show of the attitude of the new Congress. If the southern Democrats undertake to force down the apparently high tariffs on metal goods and their products—rates which are only slightly above those which will permit German competitors to undersell them, there will be some setback pending developments. There will be little objection to reductions on food stuffs, for the continued advance of the "cost of living" has threatened to force the pressure for still higher wages to the point where only the concerns with great facilities will be able to meet competition. There are so many examples of the havoc wrought by the Wilson schedule, in 1892 throughout these parts, such as empty cutlery shops, for instance, that there is great hope that the northern States' Congressmen will defend the industrial health of their section against theories of free traders.

There has been a great scarcity of coal hereabouts during the past two months, but this is now being met by large shipments from the mines and, while prices have gone high all over the State, Waterbury has continued to pay a little less than its sister cities and may see no further advance this winter. Just now the great thorn in the flesh of manufacturers and merchants alike, hereabouts, is the tremendous congestion of freight in all

yards of the New Haven railroad. Inadequate facilities, lack of men to handle the freight and of engines to handle cars, loaded or empty. So rapidly has Waterbury grown that the railroad's estimate of its freight yard needs, five years ago, has proved far too small, and in a statement issued Monday President Mellen promised enlarged freight facilities within a year. One new industry has come here, the National Carpet Sweeper Company, which is moving its Newark plant into a new plant at Torrington. It will continue to operate its woodworking plant in Marion, Ind., making its metal parts in the Torrington factory.—F. B. F.

ATTLEBORO, MASS.

DECEMBER 9, 1912.

The biggest business event in Attleboro's month concerned the retirement of James E. Blake and the sale of his share of the James E. Blake Company, silversmiths, together with the Post-office block, Eden factory, Electric Chain factory, his South Main street residence and many thousand feet of land in the heart of Attleboro's business center. Guesses rate the transaction from $600,000 up. Mr. Blake suffered a slight shock a year ago and intends to travel to Europe, Panama and South America for his health's sake. Eventually he may locate in California. The silver concern was purchased by Horace Remington & Sons of Providence. While it is not the present plan, it is expected that the Remington refinery and one or two other firms in which the company is interested will remove to Attleboro. A new factory, four stories and of brick, is to be built on Wall street. The W. E. Hayward company is to double its floor space by building a new addition. E. A. Slade & Co. is planning to double its floor space. The demand for bracelets for watches is so great that it indicates that this fad will rule the holidays. Several firms in town are rushed trying to keep up with orders. Reports of the year for silversmiths indicate that 1912 has been a record-breaker.

The E. Stebbins Manufacturing Company, manufacturers of plumbing brass goods, Springfield, Mass., will be reorganized, the creditors will be paid in full and the capital increased from $50,000 to $100,000, the new securities being in the form of preferred stock. The board of directors will consist of Frederick Harris, L. J. Powers, F. L. Chapin, C. H. Downs and Joseph Shattuck, Jr.

MERIDEN, CONN.

DECEMBER 9, 1912.

Even the most pessimistic of observers can find no fault with the business conditions in Meriden at the present time. If there is a factory in Meriden not running full time the writer does not know of it. On the contrary many of the factories are working some, if not all of their departments, until eight or nine o'clock in the evening. It is true that orders came slowly during the spring months, but the demand for goods at present will more than make up for that and the year 1912 will be considered by most to have been good, viewed from a business standpoint. One of the encouraging indications in regard to our local business is the fact that a number of new manufacturing firms have sprung into existence during the past two years. They, perhaps, are not employing many hands and their volume of business as yet is not large, yet this is a step in the right direction, and with a little encouragement and possibly a little financial assistance from our Board of Trade they may become important factors in the development of our city.

Many of our factories have outgrown their old quarters and have been compelled to build additions to their plants. The Edward Miller Company, manufacturers of lamps, chandeliers, portables, have just completed one large building and have another under way. This, if nothing else, will tend to show the healthy condition of business here. Business in the factories manufacturing silverware is good; this in view of the fact that the local factories recently announced an increase in their selling price, made necessary by the advance in silver is encouraging, indeed.—F. O. V.

NEWARK, N. J.

DECEMBER 9, 1912.

The year of 1912, now near at the close, has not been a really good one, as most manufacturers report business quiet, even at this period of the year, when the lines made for the holiday trade are always in strong demand. There is a disposition among manufacturers, jobbers, retailers and the general public to curtail their buying somewhat, due to the uncertainty of the tactics of the new administration. One watch company in the East has cancelled an order for 25,000 jewels. The Sanitary Can Company, of New York City, have plans for a new factory to be built at Niagara Falls, N. Y., to be two and one-half stories in height, 128x251 feet in size. N. M. Lowry, of 447 West Fourteenth street, New York, has drawn the plans. The Albany Foundry Company and the Troy Machine Works, of Albany, N. Y., have rebuilt their foundry and nickel plating shop, on Rensselaer Island. J. R. Marshall is the general manager.

O'Neill & O'Neill are making a new line of mirror and powder puff combination, are making many shoe slides and buckles, have put in new silver plating bank and enlarged the factory. The E. A. Whitehouse Company are making saddlery and automobile specialties and do some work in gold and silver.

C. Lemaitre & Co. have taken another floor at 28 Boudinot street and have added a general line of jeweler's findings. The business, under the management of Mrs. Lemaitre, has been very successful. Wagner & Co. have increased the output of their jewelry factory. The Keystone Pen Company, of Arlington, have increased the output of 14-karat gold pens. They make the points now of hard iridium, while before they were alloyed with platinum. The Rosenbaird Manufacturing Company have given up the manufacture of novelties and now make only brass, German silver, silver and gold mesh bag frames.

PHILADELPHIA, PA.

DECEMBER 9, 1912.

Business conditions are showing improvement in all lines. There is no boom, but there is a distinct improvement noticed throughout the trades. The metal workers, refiners, smelters, jewelers, silversmiths, as well as the supply men and manufacturers in various lines, are fairly busy. On account of the depression during the past four years, prices have been reduced on many lines, while the cost of living has gone up. Keen competition, low prices of manufactured goods, the advance generally in raw materials, has made the conducting of most any business a science. The business man nowadays is getting to be an expert, rather than a hit or miss.

W. W. Fulmer & Co., manufacturing jewelers, have moved to the Bowes building and added to their equipment considerable machinery. G. A. Schlechter, of Reading, Pa., has had some good orders for badges, pins and medals.

Matz Bros. & Co., manufacturing jewelers, 111 South Eighth street, have enlarged their shop, put in more machinery and added more hands to the force. Robert Russell, for nine years shop foreman for M. Sickles & Sons, has opened a shop to manufacture jewelry at 722 Chestnut street. He will make a specialty of gold and platinum diamond mountings, emblems and jeweler's findings. Bureau Bros. have sold their bronze foundry, at Twenty-first street and Allegheny avenue, and are building a new foundry, office and other buildings at Twenty-third and Westmoreland streets. The new plant will be much larger than the old one and have a complete equipment. William E. Heisley, for the past six years with the Fowle Manufacturing Company, of Newburyport, Mass., has opened a silverware factory here at 712 Sansom street.

LOUISVILLE, KY.

DECEMBER 9, 1912.

Reports locally are of brisk business in all of the metal lines, with prices steady at a firm level. The supplying of the wants of the distillers continues to be the feature of the local copper industry, although business is good in the other branches of the trade. Theodore Ahrens, president of the Standard Sanitary Manufacturing company, whose Louisville plant, formerly operated by Ahrens & Ott, is one of the largest of the company, which with others was attacked by the government as the "Bath-tub Trust," commented at some length on the recent decision of the Supreme Court dissolving the connection. He pointed out that the selling agreement attacked had been dropped voluntarily January 1, 1911, and had existed only six months. He stated

that prices had not dropped since the decision, and named several manufacturers who had since January, 1911, been compelled to close their doors. Mr. Ahrens expressed confidence in the favorable outcome of the criminal proceedings pending against him and a number of others interested in the company, calling attention to the fact that a number of the cases had been dropped for lack of evidence, and that all points thus far decided by the court have been in favor of the defendants.

The Art Brass & Plating Company, of Louisville, suffered damage to its plant on Fifth street amounting to two or three thousand dollars by fire last week. The fire is supposed to have been caused by the explosion of a can of gasoline. There was a large amount of patterns and machinery in the building damaged by fire, but the machinery damage can be repaired. The building itself was damaged to the extent of $300. The same fire caused considerable damage to the small brass finishing plant of Rademaker & Shade, located on Center street, in the rear of the works of the Art Brass & Plating Company. The Kentucky Plating Company, a concern which recently removed to Louisville from St. Louis, locating at 919 West Market street, has purchased for its plant a ten horsepower motor from Childers & Waters, of Louisville. The company handles nickel plating work for stove manufacturers.

The Louisville Brazing & Machine Company, formerly a firm consisting of J. C. Krepper, J. L. Haag and William Terry recently incorporated, with a capital of $5,000, the three partners being respectively president, vice-president and secretary-treasurer of the new company. The company will specialize in welding of all sorts, and intends to cater particularly to automobilists in repair work. It will ultimately extend its plant to take care of the increased business which is in sight. The company's plant is at 411 East Jefferson street.

The Art Brass & Plating Works, which does a general local job business in the refinishing and repair of metal work of every description, is to lose its foreman, F. H. Oyler, who has been with the company in that capacity for two years. He will go into business for himself at Wenzel and Walnut streets, doing business under the name of the Southern Brass Works, having purchased the plant formerly operated by the firm of Dillman & Walters, which was dissolved by the death of Mr. Walters some months ago. Mr. Oyler will be succeeded at the Art Brass and Plating Works as superintendent, by William Lupmeyer, of New Albany, Ind., now with the Standard Sanitary Manufacturing Company's Louisville plant.

The recently-organized Simplicity Shade Adjuster Company, 628 Scimitar Building, Memphis, Tenn., which will manufacture its product in brass and iron, is advertising for machinery for the equipment of its plant in that city, with a view to beginning operations at once.

The Universal Stenotype Company, a corporation with headquarters at Owensboro, Ky., is manufacturing and marketing a machine which it seems must of necessity ultimately come into general use, and when it does, will put the numerous systems of manual shorthand on the junk-pile. As indicated by the name of the company, the machine, which is made entirely of aluminum, is called the Stenotype, and is designed to write shorthand, on a new system, in which the sounds are represented by letters, instead of arbitrary symbols. The great advantage of the machine is that matter can be taken by an expert from dictation at a tremendous speed, and his notes transcribed at leisure by any other operator, inasmuch as there are no individual peculiarities to impair their legibility, as is the case with ordinary shorthand. The company has adopted the system of placing its machines in the various business colleges, in order that operators may be trained in their use, as of course an understanding of the system of sound-recording for which the machine is intended is necessary. The fact that the stenotype is made of aluminum gives it a distinct advantage over most writing machines, in the matter of convenience of handling, as it weighs only eight pounds. The company is constantly adding new equipment, and has increased its capacity to sixty machines a day—G. D. C.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 99 JOHN STREET, NEW YORK

ADDITIONAL TRADE NEWS WILL BE FOUND UNDER "CORRESPONDENCE."

The American Rotary Valve Company, Anderson, Indiana, is erecting a brass and iron foundry.

The Kokomo Brass Works, Kokomo, Indiana, are making an addition to their brass plant, 46 by 87 feet.

Benjamin J. Downs has petitioned the aldermen of Everett, Mass., for a permit to operate a brass foundry in that city.

It is reported that The Peck Brothers Company, New Haven, Conn., will make alterations to its foundry at an estimated cost of $2,500.

The Charles C. Crooks Company, of Baltimore, have installed diamond cutting machinery, this department is in charge of John B. Janssens.

The Bridgeport Brass Company, Bridgeport, Conn., have started work on the erection of an addition to their tube mill, 360 by 50 feet.

The Oliver Typewriter Company, New York, are adding two large buildings to their already extensive plant at Woodstock, Ill.

Thomas Savill & Sons will erect a brass foundry at Watts and Wallace streets, Philadelphia, Pa., for the manufacture of plumbers brass goods.

The American Rotary Valve Company, it is reported, has started work on the construction of its proposed brass and iron foundry at Anderson, Ind.

The Indiana Die Casting Development Company, Indianapolis, Indiana, desires to receive catalogs from manufacturers of machinery, small tools and foundry supplies.

C. H. Besly & Company, manufacturers and dealers in machinery and machinists supplies, announce that extensive additions are contemplated for their plant at Beloit, Wis.

The L. C. Smith Company, Bridgeport, Conn., has started a brass foundry, and, it is stated, will cast a special non-corrosive bronze into bars and billets for the manufacture of sheets.

Manning, Bowman & Company, manufacturers of nickel, aluminum and silver plate, Meriden, Conn., have awarded the contract for the construction of a factory 40 by 120 feet, five stories.

The United Foundry Company, Petaluma, Calif., began operations on November 20. Brass, bronze and iron castings will be turned out. Charles Moss, P. H. Crughlin and H. Blint compose the company.

The Standard Underground Cable Company, Perth Amboy, N. J., is erecting a new storehouse. This company has a brass foundry for using up wire scraps to make into bars to draw into wire.

The Ontario Silver Company, Ltd., and the Wm. Rogers Manufacturing Company, of Niagara Falls, Ontario, manufacturers of silver-plated tableware, have been taken over by the William Rogers Manufacturing Company.

The American Brass Company, Waterbury, Conn., will erect a tube mill as an addition to the plant of the Benedict & Burnham Manufacturing Company. The building will be of brick and steel, one story, 199 by 224 feet.

The M. G. M. Manufacturing Company, Detroit, Mich., are building a machine shop and foundry at 1532 Fort street, for the manufacture of special brass goods and air compressors. The president of the company is H. B. Haberkorn.

The Republic Metalware Company, Buffalo, N. Y., have just completed a large seven-story concrete building, as an addition to their manufacturing plant and have made extensive alterations to their enameling department.

The Enterprise Brass Works, Muskegon Heights, Mich., are completing an addition to their plant, which includes brass foundry, metal finishing shop and polishing and plating room. They will manufacture aluminum crankcases for automobiles.

It is reported that the Birmingham Brass Company, Ltd., is preparing plans for a foundry plant at Toronto, Ontario. This company was recently incorporated for $40,000. The directors are Frederick Lee, Mahlon D. Culvert and William Cartwright.

The Southern Brass Manufacturing and Plating Company, Houston, Texas, have recently increased their facilities to take care of their growing business. This company manufactures architectural brass and bronze products and has a very complete plating department.

B. Hengst announces that he has sold out his interest in the Northern Ohio Manufacturing and Refinishing Works, Cleveland, Ohio. W. G. Kania is now the proprietor. This company does gold, silver, nickel, brass and bronze plating, making a specialty of safety razors and similar articles.

In the account of the Anthony Crucible Furnace, manufactured by the Anthony Company, Long Island City, N. Y., in THE METAL INDUSTRY for November, it was stated that compressed air is used as an atomizing medium. This was incorrect as no compressed air whatever is used as an aid to the atomizing of the oil.

It is reported that Charles Crary, representing the Medicine Hat Pump & Brass Manufacturing Company, Ltd., has entered into an agreement with the City Council at Medicine Hat, Alberta, Canada, to establish a plant there to cost about $50,000. The Company will manufacture pumps, wind-mills and all kinds of brass goods.

Dodge Brothers, manufacturers of automobile parts, drop forgings, bronze castings, etc., Detroit, Mich., have installed a plating plant for the use of their own assemblies. The equipment consists of eight six feet tanks, two generators, three rheostates, one 1,500 Weston ampere meter and one Weston electric voltmeter.

The sixteenth annual convention of the National Founders Association, held at the Hotel Astor, New York, on November 20 and 21 was exceptionally well attended and one of unusual inspiration. An exceptionally timely address was made by President Briggs, relating mainly to labor laws and wages in the foundry industry.

The business of the Peckham Manufacturing Company, manufacturers of cut leathers and leather polishing meal for use in dry tumbling barrel work, Newark, N. J., has doubled itself within the last two years. The increase is in both the foreign and domestic trade, and the present capacity of their plant is worked to its fullest capacity.

The H. W. Johns-Manville Company, New York, have opened a new southern warehouse at Atlanta, Georgia, containing a floor space of about 10,000 square feet. Such products as roofing, boiler and pipe coverings, cements, packings and electrical, railroad and automobile supplies, will be kept on hand, thus minimizing the chance of delay in delivery.

The report published in the daily papers relating to a new process for the recovery of gold from sea water, which stated that this process was being tried out by the Maryland Steel Company, Sparrows Point, Md., is denied by the company, through F. W. Wood, president, who states that they have no knowledge of the process and are concentrating their efforts on the metallurgy of iron and steel.

The Hobbs Manufacturing Company, Worcester, Mass., which recently increased its capital stock from $160,000 to $300,000, has purchased the control of the American Stamp & Ticket Vending Machine Company, New York, and will begin the manufacture of these machines on a large scale at the Worcester plant. C. W. Hobbs is president and general manager and H. W. Goddard is treasurer.

The Bridgeport Testing Laboratory, 1119 Broad street, Bridgeport, Conn., report that their business is increasing very rapidly. They make a specialty of analyzing and testing metals and other industrial materials and working out factory and foundry problems. They have facilities for giving prompt and accurate service at very moderate charges. H. T. Leavenworth, formerly chemist for the Crane Company, is at the head of this laboratory.

The Dahm & Kiefer Tanning Company, Chicago, are one of the largest manufacturers of sheep skins in the West and make a specialty of furnishing leather to brass and iron finishers for polishing and buffing. They either furnish the leather so that the manufacturer can cut his own wheels, or will make the wheels to order if given the specifications. The leather handled by this company is tanned especially for the purpose and has given satisfaction to everyone who has used it.

The annual exhibition of bronzes in Pittsburgh, Pa., will be held at the Carnegie Art Galleries for thirty days beginning January 10, 1913, under the auspices of the Art Society of Pittsburgh. The work of the leading American sculptors will be shown. The exhibition is being arranged by the National Sculpture Society, whose circulating exhibit will be seen in eight American cities during the season. A jury of noted American sculptors will select 200 bronzes from those submitted by sculptors in this country, and no work will be included that was on view three years ago.

There will be an added feature at the Thirteenth National Automobile Show, to be the largest ever held, Madison Square Garden and Grand Central Palace, New York, January 11-25, 1913. During the second week, which will be devoted to commercial vehicles, it has been decided to hold a machine tool exhibit. The committee has received assurance of co-operation from the National Machine Tool Builders' Association, whose exhibit of machine tools will be greatly appreciated by designers, engineers, manufacturers of cars and others who are anxious to note the latest strides in machine construction.

The Hanson & Van Winkle Company, Newark, N. J., are sending out from their Chicago office a little folder relating to Tallowene, a material for greasing wheels, which they state is 90 per cent. pure, fresh, refined tallow, the other 10 per cent. consisting of ingredients that harden and preserve it. This material is put up in bricks and the makers state it will go practically twice as far as an equal quantity of tallow, because it does not melt so easily. It can be used in all climates at all working temperatures. They solicit trial orders, the price being 12 cents per pound.

I. M. Jacobson & Sons, metal merchants and manufacturers of all metal alloys, Detroit, Mich., wish to announce that they are operating a company for the sale of strictly virgin metals of every description and are manufacturing all metal alloys used by all lines of trade, particularly all babbitt, metal alloys and all grades of solders. They also manufacture all ingot metal alloys for brass foundries, and guarantee quality and are prepared at all times to make immediate deliveries. They specialize

in making contracts with all manufacturers to purchase all their output of all grades of scrap metals, drosses and all metal residues.

The Keystone Bronze Company, Pittsburgh, Pa., which also operates the plants of the Best Manufacturing Company and the Brighton Brass & Bronze Company, New Brighton, Pa., have just completed extensive improvements at the New Brighton Works, adding about 2.500 square feet of floor space. This will about double the present number of employees. Extensive improvements for the Pittsburgh works are now under contemplation. The improvement anticipated will enable the company to turn out about 1,000,000 pounds of copper, bronze and brass castings per month. W. D. Berry is superintendent of all the plants.

The Standard Machinery Company, Providence, R. I., manufacturers of presses, drop hammers, rolling mills wire drawing machinery, etc., have purchased six acres of land in Auburn, R. I., and have completed plans for the erection of three buildings, which will be three times the size of their present plant. The main building will be 350 by 175 feet; the second building will be 100 feet square and the third about 60 feet square. They intend to break ground in the very near future and expect to be in the new plant by the spring of 1913. In addition to installing a new power plant, including engines and boilers, one new electric crane and new steam hammers will be installed.

Some recent applications of Dawson Hardened Copper, which was described in the April, 1911, issue of THE METAL INDUSTRY, are for the manufacture of thrust plates on the driving wheels of electric locomotives, piston rings in drills and air compressors, replating case hardened bushings and valves, rock drills, heavy bearings in motors and electric cars, soldering points to replace pure copper points, disks for frictional clutches, heavy bearings in sand crushing rollers, screw gears in revolving turrets of large battleships and various gears in the breech blocks of 12 and 14 inch guns. This metal is manufactured by the S. R. Dawson Hardened Copper Company, 42 Broadway, New York, who report a constantly increasing demand for their product and state that they are ready to furnish hardened copper either in ingots or finished castings from customer's patterns.

The Roessler & Hasslacher Chemical Company, 100 William street, New York, on Monday, November 25, held a very successful exhibition of Trisalyt at the plant of the American Oil & Supply Company, Lafayette street, Newark, N. J. The demonstration was particularly in the interests of the use of Trisalyt for copper, brass, gold and silver electro-plating for manufacturing jewelers and the experiments carried on by William Schneider, demonstrator and Dr. M. G. Weber, as lecturer, were closely watched by a large number of attending jewelers. Carl Ditmar, the general sales manager, was also in attendance and took great pleasure in answering questions from all interested parties. The company has established an experimental station at Perth Amboy, N. J., where investigation work relating to the chemicals necessary for plating is carried on by platers, chemists and metallurgists.

NEW BRASS PLANT

The new plant of The Bunting Brass and Bronze Company, manufacturers of brass, bronze and aluminum castings, Toledo, Ohio, consists of one main building, two stories 60 by 180 feet, with five wings on one side. The construction of the buildings is steel and brick. The foundry is about 28 feet high under the eaves and about 60 feet at the top of the monitor, which, with the fact that the furnace room is on the side and entirely separate from the foundry proper, makes the foundry at all times free from gases. In the furnace room the same ventilating construction is carried out. Oil-burning furnaces of the Schwartz and Steele-Harvey type are used exclusively. The company state that the results of the Steele-Harvey installation have been more than satisfactory as regards the quantity of metal melted, the low consumption of crucibles, the ease and economy of operation throughout. In the foundry proper, Tabor molding-machine equipment, such as power squeezers, hand and power roll-over machines, are operated. About eighty men are employed in the foundry in the production of castings, largely for the automobile trade, such as aluminum crank and transmission cases and brass and bronze castings of various descriptions. About the same number of men are engaged in the machine department in the production of automobile machined parts, such as engine bearings, bushings, water and oil pumps, and similar parts.

FIRE

The plant of the Poughkeepsie Brass Foundry, Poughkeepsie, N. Y., was practically destroyed by fire on the morning of November 28, causing a loss estimated at $15,000.

CHANGE IN FIRM

The White Iron Works Company, Cleveland, Ohio, manufacturers of structural and ornamental iron and brass work, have succeeded the Eureka Iron Works Company. The officers of the company are: C. S. White, president and manager; C. M. White secretary and treasurer; superintendent, A. H. Monnich.

The Colwell Lead Company, New York, have purchased the plant and business of the Ideal Manufacturing Company, manufacturer of plumbing supplies, Detroit, Mich. The plant will be enlarged and a complete stock of plumbing gas, steam and engineers supplies will be carried. John J. Plath has succeeded James W. Dwyer as general manager.

REMOVALS

Nathan J. Michaelson, manufacturing jeweler of Baltimore, Md., has moved his plant from 905 to 918 East Baltimore street.

The Curtis Centrifugal Dryer Company, manufacturers of metal goods drying machines, have moved from their old location and are now at 25 Union street, Worcester, Mass.

The A. & G. Plating Company, gold, silver, nickel, copper and brass plating in all the latest finishes, Pontiac, Mich., have moved their plant to the Osmun Building, where they will have much more room than in the past.

The Quigley Furnace & Foundry Company have removed their engineering and general offices to their works at Springfield, Mass. Sales offices are maintained at 50 Church street, New York, and the McCormick Building, Chicago.

The Norwalk Brass Company, at present located on Mechanic street, Norwalk, Conn., has made arrangements, it is reported, to move to the old Colonial Foundry in East Norwalk, where the company will have much better shipping facilities. Although no definite time has been set for the removal it is understood that it will occur about the first of the year.

INCREASE OF CAPITAL STOCK

The New Britain Machine Company, New Britain, Conn., has increased its capital stock from $500,000 to $600,000.

The C. M. Hall Lamp Company, manufacturers of automobile lamps, Detroit, Mich., expect to move into their new factory at an early date and have increased their capital stock from $110,000 to $150,000.

INCORPORATIONS

Business organizations incorporated recently. In addressing them it is advisable to include also the names of the incorporators. Particulars of additional incorporations may frequently be found in the "Correspondence" columns.

The Galion Brass and Bronze Company, Galion, Ohio. Capital $75,000, to do a general brass foundry business. Incorporators: C. J. Rath, B. L. Sites and J. G. Brown, all of Galion.

The Aluminum Products Company, Detroit, Mich. Capital stock, $15,000. To manufacture aluminum goods. Incorporators: Joseph Sillman and others, of Detroit.

The N. N. Hill Brass Company, Chatham, Conn. Capital stock, $150,000. To manufacture brass goods. Incorporators: Thomas C. Perkins, Arthur Perkins, N. N. Hill, all of Chatham.

Andrew Campbell, Inc., Waterbury, Conn. Capital stock, $50,000. To manufacture copper and brass goods. Incorporators: A. C. Campbell, H. B. Campbell and F. T. Reeves, all of Waterbury.

The Columbus Auto Parts Company, Columbus, Ohio. Capital, $25,000. To manufacture automobile parts. Incorporators: R. E. Kleges, C. J. Krag, C. K. Kleges, J. J. Stoddart, W. D. McKinney, all of Columbus.

PRINTED MATTER

Metals: Albert A. Moers, 24 Stone street, New York, has issued a very artistic desk blotter. This blotter announces that Mr. Moers represents the original producers of St. Helena's antimony and Banka and Mt. Autong tin.

Furnaces: W. S. Rockwell Company, 50 Church street, New York, have issued catalog No. 16, under date of September, 1912, which gives complete descriptions of the Rockwell semi-automatic furnaces used for annealing, hardening, tempering, heat treating of aluminum, brass, copper, german or sterling silver, etc. Copies upon application.

Foundry Machinery: The Vulcan Engineering Sales Company, Chicago, have issued circular matter relating to the various classes of foundry machinery for which they control the production and sales. Included in this apparatus are the Q. M. S. hand and power, traveling and jib cranes and pneumatic hoists. Copies of these bulletins may be obtained upon request.

Burning Fuel Oil: Tate, Jones and Company, Pittsburgh, Pa., have issued catalogs Nos. 140 and 141, under date of August, 1912, which are contained in one cover, and show their complete line of oil burning equipment, which covers every purpose and condition under which oil is used as a fuel. There is considerable valuable information contained in these bulletins which will be sent upon request.

Gas Efficiency: "A Thousand Uses For Gas" is the title of a house organ published by the United Gas Improvement Company of Philadelphia. This publication is in its first volume, number 4 being dated September, 1912, and is devoted to the uses of gas in the esonomical manufacturing of goods. In the coming numbers of the publication some of the more important uses of gas will be graphically described.

Hardware Specialties: Cassaday-Fairbanks Company, Chicago, have issued a comprehensive catalog, containing 175 pages and index, giving a complete description of the line of their hardware specialties. This company is stated to have the most complete factory of its kind in America and does contract work of all kinds as well as stampings and automatic machine work. Copies of this catalog may be obtained upon request.

Steam Turbines.—In a 120-page book entitled "DeLaval Steam Turbines, Multistage Type," the DeLaval Steam Turbine Company, of Trenton, N. J., has presented much more than an ordinary trade catalog. A third or more of this publication is devoted to a discussion of the "speed-compromise" problem, that is, finding the best means of reconciling the high speed natural to steam turbines with the low or moderate speeds of driven machinery. The relative advantages of the several fundamental types of turbines, as affecting this and other matters, are discussed under thirteen chapter heads. The remainder of the book is occupied by a detailed description of the design and construction of the DeLaval multistage or multicellular turbine, which is built in capacities of 500 h. p. and up, and of the DeLaval speed reduction gear, by means of which this turbine is applied to driving standard-speed direct-current generators, centrifugal pumps and blowers, and for rope and belt drive.

CATALOG EXHIBIT

An exhibition of every kind of catalog may be seen at The Metal Industry office, 99 John street, New York. The Metal Industry is prepared to do all of the work necessary for the making of catalogs, pamphlets, circulars and other printed matter. Estimates will be furnished for writing descriptions, making engravings, printing, binding, for the entire job from beginning to end or any part of it.

AD NEWS

Fuel Oil.—The Waverly Oil Works Company, Pittsburgh, Pa., are advertising fuel oil in this issue. In view of the peculiar conditions existing in the fuel oil market, users of this material will be glad to hear about this source of supply.

Persels Pure Nickel Salts.—These salts can now be obtained in this country by addressing the Chemical Department, B. O. Bowers & Company, temporary agents, 6 Harrison street, New York. A recent article in THE METAL INDUSTRY gave some particulars regarding this material and those seeking further information are referred to the above-mentioned address.

Chemicals.—The Apothecaries Hall Company, 18 Benedict street, Waterbury, Conn., state in their ad. that by contracting for a whole year's supply of chemicals a great saving can be effected by platers, galvanizers, and metal manufacturers who use chemicals and factory supplies, even in moderate quantities. Their advertisement gives full particulars.

Aluminum.—The Foreign & Domestic Metals Company, Inc., 476-8 Rockefeller Building, Cleveland, O., suggest in their ad. that before making contracts for 1913 for 98-99 per cent. pure virgin ingot aluminum, it will be to the interest of consumers of this metal to get their attractive prices. They also solicit inquiries for prompt shipment on Straits pig tin, ingot copper, pig lead, antimony and spelter. H. L. Schwarzenberg is the manager of this company.

Neutrol.—William Berkel Chemical Company, 683 Communipaw avenue, Jersey City, N. J., make an announcement in the advertising pages regarding Neutrol, the new preparation for preventing the accumulation of carbonate in silver plating baths. They issue a little folder "L-1," giving full information regarding this material, which will be sent to those interested on request. This firm also furnishes silver cyanide (single cyanide), potassium silver cyanide (double cyanide), analyzed silver, plating solutions, ready for use.

INFORMATION BUREAU

Any firm intending to buy metals, machinery or supplies, and desiring the names of the various manufacturers and sellers of these products can obtain the desired information by writing to THE METAL INDUSTRY, 99 John street, New York. Commercial questions are answered by return mail. Our Information Bureau is for the purpose of answering questions of all kinds.

METAL MARKET REVIEW

NEW YORK, December 9, 1912.

COPPER.

There has hardly been a day during the month of November when copper could not have been bought at from ⅛ to ¼ cent per pound below the combination price of the producers.

The further heavy increase in stocks of copper at the end of October and the lower prices in London, probably caused by the war scare in Europe, have naturally not been conducive to a state of confidence in the market on the part of consumers. Except from Wall Street reports, and these have always to be taken with so much salt as to entirely change their character, there has really been no buying movement at any time during the month that could be perceived by the trade outside of the big interests. The heavy deliveries during October of over 84,000,000 pounds to home consumers were, of course, on orders that were booked some two or three months back, maybe the November and December deliveries will be fairly heavy also, and the point the producers feel so certain about now is that consumers will have to come in and buy heavily for their next three months' supplies—perhaps they will! Meanwhile Europe has not been buying, the exports in October were only 47,621,342 pounds, and in November 42,887,000 pounds, the foreign stocks seem to be continually decreasing and it is predicted Europe will very soon be compelled to buy and with all this buying power ahead of the market, producers feel very secure. Lake is obtainable at around 17⅝ delivered, Electrolytic 17½ and Casting brands 17.30.

TIN.

The tin market, more than any other metal, has suffered from the Balkan war for the reason the strongest bull clique in this metal hails from Vienna and the market has had to get along without this speculative support, the consequence is, the price today is nearly 1 cent per pound lower than a month ago.

The deliveries into consumption were quite heavy, 4,300 tons, but the statistics at the end of the month are bullish rather than bearish.

Spot tin is quotable at around 49¼ to 49½ cents with futures about the same price.

LEAD.

The lead trust put the price of lead down $5 per ton and the outside interests had to follow suit. The lead trust seems to be losing its grip on the market, there is more lead coming on the market each day now from independent sources, and this is a mighty good thing for the consumers of the country. It is reported from Washington that this trust is to be investigated, we have heard of this before, but so far the powers behind the trust seem to be more powerful than the government.

The open market is from 2½ to 5 points below the trust price and futures are offered at about the same price. Spot 4.50 N. Y.

SPELTER.

The spelter market has held fairly steady and prices are about the same as a month ago. The market has been a more open market and prices have not been juggled or manipulated as during the last six months. Carload lots 7½ New York and 7.30 to 7.35 East St. Louis.

ALUMINUM.

With considerable arrivals of foreign aluminum the scarcity in spot metal has been relieved and the market is a shade easier. Spot is obtainable around 26¾ and future shipments are offered at 26¼ to 26½ cents.

ANTIMONY.

The excitement in the antimony market seems to be about over and prices are about ¼ cent below the highest. At the same time it is just as well to point out that our prices today are below the cost to import. The Cooksons is obtainable at 10¼, Halletts 9½, other grades 9⅛ to 9⅜.

SILVER.

The silver market has ruled easier and prices today are about 1 cent an ounce lower than a month ago. New York, 63⅛; London, 29 3-16.

QUICKSILVER.

The market is quiet and unchanged at $41 per flask wholesale and $41½ to $42.00 in jobbing lots.

SHEET METALS.

There has been no change in the quoted rate for sheet copper or brass. Sheet copper is quoted at 22½ to 23 cents base, copper wire, 19 cents, high sheet brass, 17⅜ wholesale, 18½ to 18⅝ smaller lots.

OLD METALS.

There has been more doing in all kinds of copper scrap and a generally better tone to the whole market with a good business doing. Prices are about the same as a month ago.—J. J. A.

COPPER PRODUCTION

(Issued by the Copper Producers' Association.)
December 9, 1912.

Stocks of marketable copper of all kinds on hand at all points in the United States, November 1, 1912		76,744,964
Production of marketable copper in the United States from all domestic and foreign sources during November, 1912		134,695,440
		211,440,404
Deliveries:		
For domestic consumption	69,369,795	
For export	55,906,550	
		125,276,345
Stocks of marketable copper of all kinds on hand at all points in the United States, December 1, 1912		86,164,059
Stocks increased during the month of November		9,419,095

NOVEMBER MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	17.75	17.50	17.70
Electrolytic	17.70	17.25	17.50
Casting	17.60	17.20	17.35
TIN	50.40	49.40	49.90
LEAD	5.10	4.50	4.70
SPELTER	7.50	7.50	7.50
ANTIMONY (Hallett's)	9.75	9.50	9.65
SILVER	63½	62⅜	63.50

WATERBURY AVERAGE

The average price of lake copper per pound as determined monthly at Waterbury, Conn.:

1911—Average for year 12¾. 1912—January, 14½; February, 14½; March, 15; April, 16; May, 16⅛; June, 17½; July, 17¾; August, 17¾; September, 17⅞; October, 17¾; November, 17¾ cents.

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the Report alone is $10. Sample copies furnished for the asking. We can furnish daily telegraphic reports of metal prices. Address THE METAL INDUSTRY, 99 John street, New York.

INQUIRIES AND OPPORTUNITIES

Under our directory of "Trade Wants" (published each month in the rear advertising pages), will be found a number of inquiries and opportunities which, if followed up, are a means of securing business. Our "Trade Want Directory" fills wants of all kinds, assists in the buying and selling of metals, machinery, foundry and platers' supplies, procures positions and secures capable assistants. See Want Ad. pages.

Metal Prices, December 9, 1912

NEW METALS.

	Price per lb. Cents.
COPPER—PIG AND INGOT AND OLD COPPER. Duty Free, Manufactured 2½c. per lb.	
Lake, carload lots	17.65
Electrolytic, carload lots	17.50
Casting, carload lots	17.35
TIN—Duty Free.	
Straits of Malacca, carload lots	49.25
LEAD—Duty Pig, Bars and Old, 2½c. per lb.; pipe and sheets, 2⅜c. per lb.	
Pig lead, carload lots	4.50
SPELTER—Duty 1⅜c. per lb. Sheets, 1⅝c. per lb.	
Western, carload lots	7.50
ALUMINUM—Duty Crude, 7c. per lb. Plates, sheets, bars and rods, 11c. per lb.	
Small lots	33.00
100 lb. lots	30.00
Ton lots	27.00
ANTIMONY—Duty 1½c. per lb.	
Cookson's cask lots, nominal	10.25
Hallett's cask lots	9.50
Chinese	9.35
Hungarian grade	9.25
NICKEL—Duty Ingot, 6c. per lb. Sheet, strip and wire 35 per cent. ad valorem.	
Shot, Plaquettes, Ingots. Blocks according to quantity	.40 to .45
ELECTROLYTIC—3 cents per pound extra.	
MANGANESE METAL—Duty 20 per cent.	.90
MAGNESIUM METAL—Duty 3 cents per pound and 25 per cent. ad valorem (100 lb. lots)	1.50
BISMUTH—Duty free	2.00
CADMIUM—Duty free	.90
CHROMIUM METAL—Duty 25 per cent. ad valorem	.98
QUICKSILVER—Duty 7c. per lb	.57
	Price per oz.
GOLD—Duty free	$20.67
PLATINUM—Duty free	45 50
SILVER.—Government Assay Bars—Duty free	64½

OLD METALS.

Dealers' Buying Prices. Cents per lb.		Dealers' Selling Prices. Cents per lb.
15.50 to 16.00	Heavy Cut Copper	16.75 to 17.00
15.00 to 15.25	Copper Wire	16.25 to 16.50
13.75 to 14.00	Light Copper	14.75 to 15.00
12.50 to 12.75	Heavy Mach. Comp.	14.00 to 14.50
9.25 to 9.50	Heavy Brass	10.50 to 10.75
7.50 to 7.75	Light Brass	8.75 to 9.00
9.00 to 9.25	No. 1 Yellow Brass Turnings	10.00 to 10.25
10.75 to 11.25	No. 1 Comp. Turnings	12.00 to 12.50
4.00 to ——	Heavy Lead	—— to 4.25
4.75 to ——	Zinc Scrap	—— to 5.25
10.00 to 12.00	Scrap Aluminum, turnings	13.00 to 15.00
15.00 to 19.00	Scrap Aluminum, cast, alloyed	18.00 to 22.00
20.00 to 22.00	Scrap Aluminum, sheet (new)	23.00 to 25.00
23.00 to 24.00	No. 1 Pewter	25.00 to 26.00
20.00 to 23.00	Old Nickel	23.00 to 26.00

INGOT METALS.

	Price per lb. Cents.
Silicon Copper, 10% ..... according to quantity	27 to 32
Silicon Copper, 20% ..... " "	30 to 32
Silicon Copper, 30% guaranteed " "	32 to 34
Phosphor Copper, guaranteed 10% " "	25 to 28
Phosphor Copper, guaranteed 15% " "	27 to 30
Manganese Copper, 25% ..... " "	27 to 30
Phosphor Tin, guaranteed 5% .. " "	60 to 63
Phosphor Tin, no guarantee .... " "	55 to 57
Brass Ingot, Yellow ..... " "	12 to 12⅞
Brass Ingot, Red ..... " "	14 to 16
Bronze Ingot ..... " "	15 to 15¾
Manganese Bronze ..... " "	19½ to 21
Phosphor Bronze ..... " "	13 to 16
Casting Aluminum Alloys ..... " "	25 to 30
PHOSPHORUS—Duty 18c. per lb. According to quantity	30 to 35

PRICES OF SHEET COPPER.

BASE PRICE, 23 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9⅛ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7⅝ to 9⅛ lb. sheet 30 x 60.	8 oz. and 9 oz. 6⅛ to 7⅝ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered at its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from 8 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add ..... 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add ..... 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 1 " " sq. ft.

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness ..... 2 " " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ⅜ inch diameter or over ..... **Base Price.**

(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

ZINC—Duty, sheet, 1⅝c. per lb.	Cents per lb.
Carload lots, standard sizes and gauges, at mill	9 less 8%
Casks, jobbers' prices	9⅛
Open casks, jobbers' prices	10

Metal Prices, December 9, 1912

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect October 1, 1912, and until further notice.

To customers who buy over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.17⅜	$0.19¼	$0.20⅛
Wire	.17⅛	.19¼	.20⅛
Rod	.17⅛	.20	.21⅛
Brazed tubing	.22	—	.25⅝
Open seam tubing	.20⅛	—	.23⅝
Angles and channels, plain	.21¼	—	.24⅛

50% discount from all extras as shown in American Brass Manufacturers' Price List No. 9.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass.... ½c. per lb. net advance
" —Best spring, drawing and spinning brass..... 1½c. " " " "
Wire—Extra spring and brazing wire..... ½c. " " " "
" —Best spring and brazing wire..... 1c. " " " "

To customers who buy 5,000 lbs. or less per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.18⅝	$0.20½	$0.22½
Wire	.18⅝	.20½	.22⅛
Rod	.18⅝	.21⅛	.23⅛
Brazed tubing	.23¼	—	.26⅞
Open seam tubing	.22½	—	.24⅞
Angles and channels, plain	.22½	—	.25⅜

Net extras as shown in American Brass Manufacturers' Price List No. 9.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring drawing and spinning brass.... ½c. per lb. net advance
" —Best spring, drawing and spinning brass..... 1½c. " " " "
Wire—Extra spring and brazing wire..... ½c. " " " "
" —Best spring and brazing wire..... 1c. " " " "

BARE COPPER WIRE—CARLOAD LOTS.

19c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	24c.	per lb. base
100 lbs. to 300 lbs. in one order	24½c.	" " "
Less than 100 lbs. in one order	26c.	" " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ O. D. Nos. 4 to 13 Stubs' Gauge, 22c. per lb.
Seamless Copper Tubing, 26c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	30	29	24	23	22	22	22	22	22	22	22	23	24	26	28	29

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1½ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 45 and 5%.

PRICE FOR TOBIN BRONZE AND MUNTZ METAL.

Tobin Bronze Rod	19c.	net base
Munts or Yellow Metal Sheathing (14" x 48")	17½c.	" "
" " " Rectangular sheets other than Sheathing	20c.	" "
" " " Rod	17½c.	" "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bar in the rough, 27⅝c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 28 B. S. Gauge, 2c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 3c. above price of pig tin.

PRICE SHEET FOR SHEET ALUMINUM—B. & S. Gauge.

	Wider than..... and including..... in coils.	3in. 12in.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.
No.	13 and heavier	34	34	36	36	36	36	39	39	39
"	14	34	34	36	36	36	36	39	39	39
"	15	34	34	36	36	36	36	39	39	39
"	16	34	34	36	36	36	36	39	39	39
"	17	34	34	36	36	36	36	39	39	39
"	18	34	34	36	36	36	36	39	39	42
"	19	34	34	36	36	36	36	39	40	43
"	20	34	36	36	36	36	38	41	42	44
"	21	34	38	38	38	38	40	43	44	50
"	22	34	38	38	38	40	40	43	47	51
"	23	34	38	38	38	40	40	43	49	52
"	24	34	38	40	42	42	42	45	51	54
"	25	36	39	41	43	43	43	46	53	57
"	26	36	39	42	46	46	46	51	55	61
"	27	36	40	44	48	48	49	54	58	64
"	28	36	40	46	48	49	49	56	62	67
"	29	38	41	48	50	52	52	61	67	72
"	30	38	42	50	52	56	62	69	72	77
"	31	43	47	55	58	63	71	74	77	83
"	32	45	49	57	61	69	77	91	90	95
"	33	47	51	60	65	73	84	91	100	110
"	34	50	55	62	70	78	91	103	110	120
"	35	..	65	70	80	90	100	115	125	..
"	36	..	80	90	100	115	120	135	..	..
"	37	..	104	114	129	144	159	174	..	..
"	38	..	124	139	154	169	184	204	..	..
"	39	..	144	164	184	204	224	..	..	..
"	40	..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 3 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GAUGE THE STANDARD. SIZES CARRIED IN STOCK.
Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Gauge.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	27	24	..	..	14	20	10	9	16	23
12.	.109.	..	..	..	..	..	..	..	26	..	..	..	15	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	17	..	..	..	..	..
16.	.065.	..	..	..	..	..	28	27	27	24	23	21	21	21	21	27	31	37
18.	.049.	..	..	..	..	33	30	29	28	25	26	26	26	..	..	..	..	..
20.	.035.	117	..	46	39	34	33	32	30	29	30	30	30	31	38	49	58	81
21.	.032.	..	..	..	40	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.	138	98	48	42	38	37	35	34	..	..	45	..	..	..	..	..	..
24.	.022.	188	133	108	88	79	73	62	60	66	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb.....	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive. American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4	per cent.	to No.	19, B. & S.	Gauge, inclusive	$0.60
6	"	"	19, "	" "	.70
9	"	"	19, "	" "	.85
12	"	"	19, "	" "	1.00
15	"	"	19, "	" "	1.15
16	"	"	19, "	" "	1.20
18	"	"	19, "	" "	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICES OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quantity and market conditions. No fixed quotations can be given, as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2½c. to 3½c. above the price of bullion.

THE METAL INDUSTRY

WITH WHICH ARE INCORPORATED

THE ALUMINUM WORLD, THE BRASS FOUNDER AND FINISHER, THE ELECTRO-PLATERS REVIEW, COPPER AND BRASS

A TRADE JOURNAL RELATING TO METALS AND ALLOYS

Index of Volume 10

JANUARY—DECEMBER, 1912

THE METAL INDUSTRY PUBLISHING COMPANY, 99 John Street, New York

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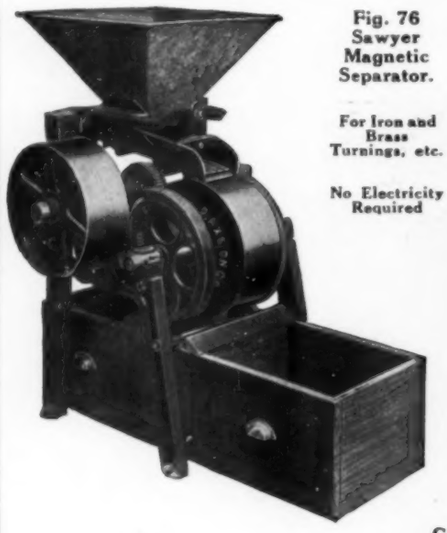

Fig. 76
Sawyer
Magnetic
Separator.

For Iron and
Brass
Turnings, etc.

No Electricity
Required

Fig. 597
Crucible Tongs

Fig. 632—Square Steel
Shell Brass Furnace

Fig. 623—Round Furnace
with Draw Bars

Fig. 902
Sand
Blast
Tumbling
Barrel

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The quickest, cheapest and most satisfactory way to clean castings is sand blasting. The Paxson-Warren Sand Blast is what you need for your factory. A ton of small castings can be thoroughly cleaned in an hour with our tumbling barrel. Or you can direct the blast by hand. In either case, you get better work and a great saving in time over usual methods.

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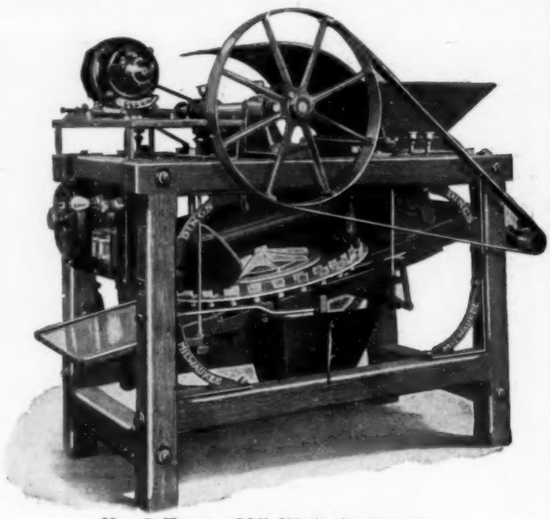

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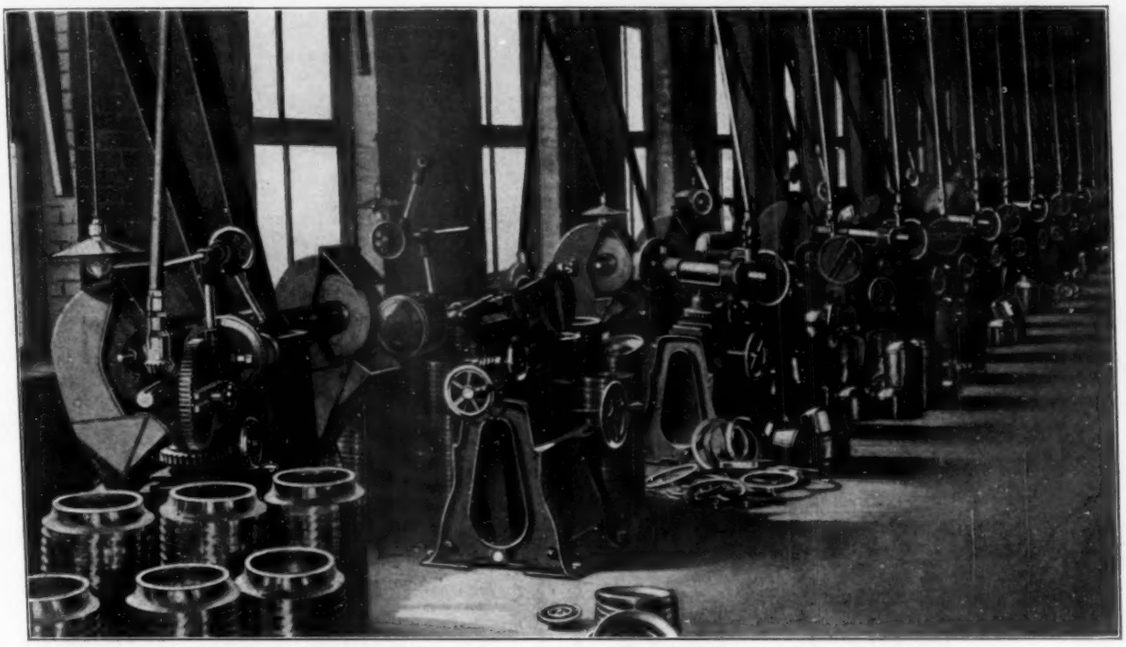
Operated in connection with any Standard Buffing Lathe



Twenty-four Machines Operating at Badger Brass Manufacturing Company's Works

Increase production **AND REDUCE THE COST OF BUFFING SHAPES** such as

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The Coe Brass Branch
The Ansonia Brass and Copper Branch
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The Coe Brass Branch
AT KENOSHA, WIS.
Kenosha Branch

Established 1802 Cable address, "Scovill"
Scovill Mfg. Co.
WATERBURY, CONN.
BRASS ROLLING MILLS
WIRE MILLS
FACTORIES for the manufacture of various articles made of brass or German Silver.
DEPOTS:
NEW YORK - BOSTON - CHICAGO

METAL GOODS
MADE TO ORDER
from
Brass and Copper
SHEETS, RODS, WIRE AND TUBING
Manganese Aluminum Phosphor Silicon and "Bridgeport"
BRONZE
Bridgeport Brass Co.
Manufacturers
BRIDGEPORT, CONN.

Hendricks Brothers
Manufacturers of
Sheet and Bar Copper
COPPER FIRE BOX PLATES and STAYBOLTS
WIRE and BRAZIER'S RIVETS
Importers and Dealers in
INGOT COPPER, BLOCK TIN, SPELTER, LEAD, ANTIMONY BISMUTH, NICKEL, Etc.
49 Cliff Street New York

C. G. Hussey & Co.
PITTSBURGH, PENNA.
Manufacturers of
COPPER
IN SHEETS, PLATES, ROLLS
ANODES
TACKS AND NAILS

NON-CORROSIVE FINEST QUALITY
Copper and Yellow
(MUNTZ) METAL
NAVAL BRASS
NAVAL BRONZE
MANGANESE BRONZE
PLATES, SHEETS, BOLTS, BARS, RODS, NAILS, TACKS, ETC.
Taunton - New Bedford Copper Co.
NEW BEDFORD, MASS.
42 Water Street, New York 61 Batterymarch Street, Boston

The **Seymour Mfg. Co.**
SEYMOUR, CONN.
German Silver
Brass, Copper and Bronze in Sheets, Wire, Rods and Tubes
COPPER AND NICKEL ANODES
Phosphor Bronze

BRASS and COPPER
in Sheets and Rolls
SILVER PLATED METAL
(for Coach Lamps)
BRITANNIA METAL
B. & M. BABBITT METAL
for Bearings
LINING METAL
for Automobile Bearings and Copper for Electrical Purposes
H. K. & F. S. Benson
GLEN RIDGE, N. J.

Britannia Metal
CASTING, ROLLING and REFINING FOR THE TRADE
Standard Rolling Mills Inc.
363 Hudson Avenue
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Wm. F. Renziehausen Co.
Rollers of Silver Anodes and Sterling Silver
ALSO DEALERS IN
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Long Distance Phone 3759 R.

"RIVERSIDE"
GERMAN SILVER
PHOSPHOR BRONZE
Sheets, Rods, Wire, Ingots, Castings, Jewelers' Bars and Alloys.
THE
Riverside Metal Co.
Riverside, Burlington Co., N. J.

DIRECTORY

METAL ROLLING MILLS

INGOT, PLATE, SHEET, ROD, WIRE, TUBE, METAL GOODS

THE PILLING BRASS CO.
WATERBURY, CONN.
Manufacturers of
ROLLED BRASS, BRONZE, GERMAN SILVER AND COPPER IN THIN GAUGES. PLATERS' METAL.

A. H. Wells & Co.
WATERBURY, CONN.
Manufacturers of
SEAMLESS . . . **Tubing**
NICKEL SILVER BRASS, COPPER, BRONZE AND PURE COPPER
TUBING FOR ELECTRICAL PURPOSES
Odd and Special Shapes, and Small Tubing a Specialty
—Also the—
BOURBON STEAM GAUGE SPRINGS
All Sizes from 8 to 36, B. & S. Gauge

Manhattan Brass Company
332 East 28th St., NEW YORK CITY
Manufacturers of
BRASS and BRONZE in Sheets, Rod, Wire, Tube, Moulding, etc. METAL GOODS made to order from Brass, Bronze and Copper.

Silver Chloride **Jackson's** Silver Nitrate
Sterling **FIRELESS** Silver
Silver Anodes, Silver Wire, Silver Solders, Granulated Silver and Pure Shot Copper. Sweeps Refined.
JOHN J. JACKSON COMPANY
91 MECHANIC ST. NEWARK, N. J.

PHENIX TUBE CO.
Manufacturers of
Brass and Bronze Iron Lined Tubes
Brazed Steel Tubes
Round and Square
Main Office and Mills: Brooklyn, N. Y.
City Branch Offices: Chicago, San Francisco

DIRECTORY

LEAD AND ZINC SMELTERS AND MANUFACTURERS

PIG LEAD, SPELTER, SHEET ZINC AND ROD, ACIDS

INTERNATIONAL LEAD REFINING CO.
PIG LEAD
Refinery: EAST CHICAGO, INDIANA
Sales Agents
UNITED METALS SELLING CO.
42 Broadway, New York

Illinois Zinc Company
Manufacturers of
SPELTER, SHEET ZINC, and SULPHURIC ACID
PERU, ILL.

W. FISHER
Agent, 81 and 83 Fulton Street
New York City
Telephone, 139 Beekman

Matthiessen & Hegeler Zinc Co.
LA SALLE, ILLINOIS
SMELTERS OF SPELTER
and Manufacturers of
SHEET ZINC and SULPHURIC ACID
Zincs for Leclanche Battery
Special Sizes of Zinc to order. Rolled Battery Plates. Selected Plates for Etchers' and Lithographers' use. Selected Sheets for Paper and Card Makers' use. Stove and Washboard Blanks.

SPELTER
for all purposes, including the Standard
HORSE HEAD and BERTHA
High Grade Brands
The New Jersey Zinc Co.
55 Wall Street, New York

Sandoval Zinc Company
Smelters of
HIGH GRADE SPELTER AND PIG LEAD
Chemical Department
East St. Louis
ZINC CHLORIDE Granulated, Fused or Liquid and all Kinds of ZINC SALTS
General Offices:
410 North Peoria Street
CHICAGO, ILLS.
Works: Sandoval and East St. Louis, Illinois.

High-Grade Spelter and Sulphuric Acid

HEGELER BROTHERS, DANVILLE, ILL.

COLD ROLLED ZINC
IN COILS FOR
DRAWING and STAMPING
THE PLATT BROS. & CO.
WATERBURY, CT.

THIS SPACE
FOR SALE

DIRECTORY

METAL SMELTERS, REFINERS, DEALERS

BUYERS AND SELLERS OF NEW AND OLD METAL

Albert A. Moers

24 Stone Street, New York

..PIG TIN..

Write me to-day for attractive prices in large and small quantities. Only 98 per cent. and 99 per cent. handled. Can be used for all purposes. 250 tons per month.

Established 1789

NATHAN TROTTER & CO.

Pig Tin	NICKEL	Ingot Copper
Pig Lead	ALUMINUM	Antimony
Spelter		Bismuth

36 No. Front St.
PHILADELPHIA, PA.

SAMSON MANGANESE BRONZE
NO. 5. PHOSPHOR BRONZE
BEARING METAL
PLATA WHITE BRONZE
BABBITT METAL
Ingots or Castings

THE ATKINSON COMPANY
571 Lyell Avenue ROCHESTER, N. Y.

HIGH GRADE

Copper Composition Yellow } **INGOT** { Copper Composition Yellow

WHITE & BRO., Inc.

Station K, Philadelphia, Pa.

Wm. F. Renziehausen Co.

Gold and Silver Refiners

Sweep Smelters, Assayers and Analytical Chemists

Full value paid for any material containing Gold, Silver and Platinum

43-47 Oliver Street - - Newark, N. J.

Long Distance Phone, 3759-R

MAGNESIUM

is lighter than aluminum and therefor offers the best means for producing castings of

Lightest Weight

Always specify "Leavitt's" Magnesium

C. W. LEAVITT & CO.

HUDSON TERMINAL BUILDING NEW YORK

The Morton B. Smith Co.

241 and 243 Front Street, New York

OFFER FOR SALE:

HEAVY COPPER AND WIRE, Ready for the Crucible
COMPOSITION, Carefully Selected
HEAVY YELLOW BRASS, Free from Iron
OLD METALS GENERALLY

Illinois Smelting & Refining Co.

122 N. Peoria St., Chicago, Ill. Cable Address, "Smelref," Chicago

Manufacturers of

Pig and Bar Lead, Spelter, Babbitt Metals Linotype, Stereotype, Monotype and Electrotype Metal, Yellow Composition and Phosphor Ingots

Dealers in New and Old Metals, and the Largest Buyers of Zinc Dross, Skimmings, Sal Skimmings, Scrap Zinc and Aluminum

CASH PAID FOR SECOND-HAND MATERIALS

Platinum, Silver, Quicksilver, Bismuth, Nickel, Magnesium, Cadmium, Gas Mantle Dust, Ores and Chemicals, and all similar goods

JOSEF RADNAI 36 Fulton Street, New York City

To Buy and Sell Metals to the Best Advantage

Let People Know You are in Business

S. BIRKENSTEIN & SONS

379-407 W. Ontario Street, Chicago, Ill.

Lake, Electrolytic and Casting Ingot Copper

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METAL FOUNDERS, FINISHERS, WORKERS AND SPECIALTY MANUFACTURERS

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Combs
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Signs
Advertising Novelties
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Cooking Utensils
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Models

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New York Chicago
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HOME OFFICE
MANITOWOC, WIS.

FACTORIES
Newark, N. J. Two Rivers, Wis.
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EVERYTHING IN

ALUMINUM

SPECIAL GOODS made to order.
Correspondence Solicited.

CASTINGS

NATIONAL SHEET METAL COMPANY

Manufacturers of
NICOLINE, Brassene, Copperene and Bronzene. Nickel Tin, Brass Tin, Bronze Tin, and Copper Tin. Sheet Zinc, polished.
Large Saving to Manufacturers
Last Year's Sales 1,000,000 lbs.

For further information Address office, PERU, ILLINOIS

METAL SPECIALTIES

Let us figure on your Metal and Wire specialties in Brass, Copper, Aluminum, Tin and Steel. Stamping, Drawing, Spinning and Wire forming of all descriptions, in all Finishes.
Send us your Samples and Specifications.

PRITCHARD STAMPING CO.
999 Main Street, East ROCHESTER, N. Y

Brass Silver Copper
Aluminum Zinc Steel

METAL SPINNING and STAMPING

of all kinds

Art Brass Carburetors Floats Etc.
Die Making and Screw Machine Work

The Toledo Metal Spinning Co.
2218-2220 Detroit Ave. Toledo, O.

SILVER COPPER BRASS
ALUMINUM ZINC STEEL

Metal Spinnings

of all kinds
In large or small quantities

FIXTURE PARTS
CARBURETOR FLOATS
ART BRASS

THE CRESCENT BRASS MFG. CO.
8410-12 LAKE AVE. CLEVELAND, O.

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SEND FOR RATES

THIS SPACE FOR SALE

SEND FOR RATES

NO JOB TOO LARGE OR TOO SMALL FOR US

Northern Ohio Manufacturing and Refinishing Works

B. HENGST, Prop.

GOLD, SILVER NICKEL **PLATING** BRONZE AND BRASS

SAFETY RAZORS A SPECIALTY

Repairing of all Kinds of Metal Goods, also Lamps and Chandeliers

2069 EAST 4th STREET CLEVELAND, OHIO

MAX SCHWEIZER

230 NORTH AVE.

BRIDGEPORT, CONN.

PRACTICAL ETCHER

— ON —

Silverware, Knives, Scissors, Hardware, Signs, Clock Dials, Name and Embossing Plates, &c.

COZLETIZING EXPERT

Would like to hear from manufacturing firms desiring improved rust-proof process for articles of iron and steel. For particulars address

KOZLETIZIN

Care THE METAL INDUSTRY

RUST PROOF BLACK FORMULA

FOR FULL PARTICULARS ADDRESS

WM. SCHNEIDER

Care of THE METAL INDUSTRY

99 JOHN STREET NEW YORK

THIS SPACE FOR SALE

SEND FOR RATES

The Waterbury Metal Products Co., Waterbury, Conn.

PLATING and REFINISHING

We solicit the work of manufacturing concerns not equipped to do their own plating. We also manufacture small Metal Novelties. Write for prices

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Counsellor at Law and Patent Attorney

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Washington Loan and Trust Bldg., Washington, D. C.

Formerly Examiner U. S. Patent Office

HUGH L. THOMPSON

Consulting Engineer

Waterbury, Conn., U. S. A.

Plans and Specifications for Brass and Copper Sheet, Rod, Wire and Tube Mills

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LOUIS J. KROM

Consulting Metallurgist

Non-Ferrous Alloys a Specialty

99 John Street NEW YORK

LEDOUX & COMPANY

NEW YORK

Laboratory and Office: 99 John Street

Specialists in Analyses of Metals and Alloys

THIS SPACE FOR SALE

SEND FOR RATES

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TRADE WANTS

AN EXCHANGE FOR THE WANTS OF THE METAL TRADES

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FOR SALE

METALS, MACHINERY AND SUPPLIES

FOR SALE

The following Used Dynamos for Immediate Delivery. Thoroughly Overhauled.

1-Roth Dynamo.....	50	Ampere	4	Volts	2400	R. P. M	.....good condition	$25.00	
1-Ideal "	150	"	6	"	1750	" " "	.....excellent condition..	70.00	
2-Ideal "	750	"	6	"	1200	" " "	.....good as new.....	225.00	each
1-H. & V. W. Type G-I.....	800	"	5	"	1250	" " "	.....good as new	200.00	
1-H. & V. W. Type N-6.....	800	"	5	"	 850	" " "	.....good condition	140.00	
1-H. & V. W. Colburn.....	200	"	.....4½	"	1600	" " "	.....good condition	50.00	
2-H. & V. W. Type N.....2500		"	5	"	 350	" " "	.....good condition	200.00	each
1-Phoenix Dynamo.....1000		"	6	"	 600	" " "	.....good condition	175.00	

All of the above are subject to prior sale

The Bennett-O'Connell Company, 3600 South Morgan St., Chicago, Ill.

FOR SALE

1 Mumford Molding Machine; 1 Mumford Molding Machine, with automatic rammer attachment; 2 Monarch Tilting Furnaces; 28 Cast Iron Flasks, 16 x 14 x 4" deep, made by the Brass Founders' Supply Company, Newark, N. J.; 1 High-Pressure Air Blower, manufactured by Blaisdell; 1 Paxson Wet Rumbler and 1 Dry Rumbler; 1 No. 6 Monarch Air Blower. Address WM. KANE MANUFACTURING COMPANY, Philadelphia.

FOR SALE

Four 800 Ampere Rheostats, never used. Price, new, $38.00 each; will sell for $25.00 each.

OWEN WALSH MFG. CO.,
531 W. 26th St., City.

Electro Galvanizing and Plating Plants Installed

Patent Automatic Handling Devices

U. S. ELECTRO GALVANIZING CO.

1-9 PARK AVENUE BROOKLYN, N. Y.

J. D. Smith Foundry Supply Co.

Cleveland, O.

FOUNDRY ENGINEERING FOUNDRY EQUIPMENT
FOUNDRY SUPPLIES

PLATING ROOM EQUIPMENT FOR SALE

We have a variety of plating equipment on hand, which we offer at a big bargain, including 2 Plating Dynamos, wood and iron tumbling barrels, drying oven, 11 ft. plating tank, stoves with caldrons for lye and hot water, Voltmeter, etc.

ST. LOUIS TRUNK HDW. MFG. CO.,
609 Chouteau Ave., St. Louis, Mo.

FOR SALE

1 250 Amp. 5 v. Multipolar Compound Wound Card Plating Generator and countershaft.

2 No. 7 L'Hommedieu Buffing Stands and countershafts, all in first-class condition.

CHICAGO STAMPING & TOOL CO.,
1920 W. Kinzie St., Chicago.

FOR SALE

One SAUVEUR METALLURGICAL MICROSCOPE with vertical Illuminator, camera and other parts. Address P. O. Box 1034, Waterbury, Conn.

WIPING RAGS AND COTTON WASTE FOR SALE

WALSH'S SONS & CO.
308 Ogden St., Newark, N. J.
Buyers of Scrap Material of All Kinds.

FOR SALE—Meitz & Weiss 80 H. P., 2 cylinder Horizontal Oil Engine, complete with all attachments, muffler, exhaust pipe, compressed air outfit and one-thousand-gallon oil tank. This outfit has been run less than three years and is good as new. Going into lines which require high pressure steam is reason for changing. Will sell at bargain. AUTOYRE COMPANY, Oakville, Conn.

FOR SALE—Plating Dynamo, in good condition, only run two months. Four volts, 50 amperes; a bargain. UNITED NOVELTY COMPANY, Newark, N. Y.

BUSINESS OPPORTUNITIES

PLANTS—FOR SALE AND TO LET

FOR SALE—Artistic foundry, two patents, three secret processes, fine jobbing trade. Reason—going West. Address ARTISTIC, care THE METAL INDUSTRY.

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BUSINESS OPPORTUNITIES—Cont'd.

PLANTS—FOR SALE AND TO LET—Continued

FOR SALE—PLATING and POLISHING SHOP, the only one in city. At the present time doing good business. Reason for selling, other business. Cheap to quick buyer. Address PLATING SHOP, care THE METAL INDUSTRY.

FOR SALE—Fully equipped ELECTRO-PLATING PLANT in New Orleans, established 6 years. Excellent proposition for practical man with small capital. For full particulars address NEW ORLEANS, care THE METAL INDUSTRY.

FOR SALE—Good paying BRASS MANUFACTURING ORNAMENTAL METAL and PLATING WORKS; fully equipped; long lease; cheap rent; established thirty years; wants to sell on account of sickness; will sacrifice for $9,000, at least half cash. Address BOX 1, care THE METAL INDUSTRY.

FOR SALE—SMALL BRASS AND ALUMINUM FOUNDRY near Chicago, well equipped; also equipped for metal finishing; running every day; owner going South. Address C. O. K., care THE METAL INDUSTRY.

WANTED

METALS, MACHINERY AND SUPPLIES

WANTED

HANSON & VAN WINKLE PLATING BARRELS. Address L. F. GRAMMES & SONS, Allentown, Pa.

WANTED

POWER PRESS—New or second-hand, double-action press for pressing steel cans 18" dia., 8" deep, 20 gauge. State cash price, maker's name and other information. Address POWER PRESS, care THE METAL INDUSTRY.

WANTED

Copies of THE METAL INDUSTRY for February, March and April, 1912. Write for particulars, THE METAL INDUSTRY, 99 John Street, New York.

WANTED—A 10 h. p. UPRIGHT BOILER. Must be in good condition and at low cost. Address S-1, care THE METAL INDUSTRY.

WANTED—Second-hand 6 or 8 h. p. horizontal engine and boiler. State what make, condition and price. Address HORIZONTAL, care THE METAL INDUSTRY.

INQUIRIES

Inquiries received by THE METAL INDUSTRY for Metals, Machinery and Supplies. Further particulars may be obtained by addressing the inquiry number, care THE METAL INDUSTRY. No charge for inserting these inquiries.

Inquiry No. 573—Can you tell me where I can get sheet steel or iron coated with a 2 per cent. coating of aluminum, instead of tin?

Inquiry No. 574—Can you give me any information as to where I can buy soft sheet aluminum?

Inquiry No. 575—Please advise where we can obtain celluloid rings, same as spiral springs.

Inquiry No. 576—Can you give me the names of firms that job aluminum in sheets.

Inquiry No. 577—Please give me the names of concerns manufacturing aluminum pipe.

Inquiry No. 578—Will you kindly let us know where we can procure aluminum bronze rods and sheets, rods up to 3/16 inches diameter and sheets up to 1/16 inch thick.

Inquiry No. 579—We would appreciate it if you would advise us the names of manufacturers of earthenware dipping baskets.

Inquiry No. 580—We do a great deal of soldering. Will you kindly give us the address of parties who manufacture or sell soldering irons and blow torches.

Inquiry No. 581—Can you give us the names of concerns who are in a position to do sherardizing for us?

Inquiry No. 582—Will you please give me any information you can regarding electric furnaces for hardening and tempering steel for flat leaf springs?

INQUIRIES—Continued

Inquiry No. 583—Can you give us the names of producers of foreign aluminum 98-99 per cent. pure, also names of importers of same?

Inquiry No. 584—Please give us the names of manufacturers of small metal boxes similar to those used for shaving soap.

Inquiry No. 585—Will you kindly put us in touch with the smelters of spelter for galvanizing and foundry use, both domestic and foreign?

Inquiry No. 586—Please give us the names of lead producers in North and South America and other foreign countries.

Inquiry No. 587—Can you give us particulars of any machine that will make quarter turn bends in both seamless and open seam brass tubing, 24 gauge and about ½ inch in diameter.

Inquiry No. 588—Will you please inform us where we can obtain pure nickel wire and sheet stock?

Inquiry No. 589—Can you put us in touch with some firm that can print an ad on aluminum cigar lighters.

Inquiry No. 590—We would appreciate it very much if you would put us in touch with a reliable concern that can install a complete electro-plating outfit to take care of about 300 pounds daily of small brass plumbers' supplies.

Inquiry No. 591—Kindly tell me the approximate cost of starting a small brass and aluminum foundry with four to six coke furnaces.

Inquiry No. 592—Can you tell me who makes a device for mechanically rotating platinum anodes for laboratory use?

SITUATIONS OPEN

EXECUTIVE

WANTED GENERAL MANAGER

to take charge of an established plant doing a general line of press and die work, drop forging and machine shop work. Business covers the working of steel and iron, brass, copper and aluminum, in sheets, hoops, rods, bars and wire. Some automatic machinery used. Applicant must have had successful experience as a business manager, and be able to give good references in that particular. Must be total abstainer. State age, whether you have a family, salary required, experience, etc. Address BUSINESS MANAGER, care THE METAL INDUSTRY.

SALESMEN

WANTED

Salesman for brass sheet, tubes, etc., for Chicago. State age, experience, references. Good opening for the right man. Address BRASS SHEET SALESMAN, care THE METAL INDUSTRY.

WANTED

Salesman calling on Electroplaters, Polishers, etc., to carry a new highly efficient "Nickelsalt" as a side line. Address R. F. LANG, 31 Broadway, New York.

SALESMAN

Traveler now calling on the Plumbers' Supply Trade may possibly make good connection by considering this advertisement. In application state territory you are covering; whether on a commission or salary, and if you handle side lines.

In any event, advise basis at which you desire to work.

Address MANUFACTURER, care THE METAL INDUSTRY.

WANTED—A SALESMAN calling on the HARDWARE, MACHINE, RAILROAD SUPPLY or PLUMBERS' TRADE, to solicit orders for BABBITT METALS and SOLDER. Liberal commissions. Address with full particulars, LAKEWOOD METAL CO., 123 Central ave., Newark, N. J.

MOLDERS

WANTED

LOST WAX MOULDER. A man with experience on fine core and casting in brass. Good opening for right man. Address WAX MOULDER, care THE METAL INDUSTRY.

TRADE WANTS

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SITUATIONS OPEN—Continued

MOLDERS—Continued

WANTED

BRASS MOULDERS

HEMSHER METAL CO.

18 Rapelyea Street, BROOKLYN, N. Y.

FOUNDERS

WANTED

Foreman by a large ALUMINUM and BRASS Foundry near Cleveland. Experienced, up-to-date, for AUTO PARTS. State experience, age and references. Address, CLEVELAND, care THE METAL INDUSTRY.

DIE AND TOOL MAKERS

WANTED

In a factory where metal specialties are made for others on contract, in connection with regular lines, a practical DIE AND TOOL MAKER who understands press and die work, who can do sketching when required, and who can determine from models or blue prints what blanking, punching, forming and other dies are required to produce the article and estimate the approximate time it should take to make each. Must have had experience along this line, be able to furnish good references, and to make good as a cost estimator in a live shop. No boozer need apply. State age, whether you have a family, experience, wages wanted, etc. Address ESTIMATES, care THE METAL INDUSTRY.

WANTED

TOOL MAKER experienced in BRASS DRAWING and screw machine work. Small factory in Eastern Pennsylvania. Opportunity for man of enterprise and stability. Applicants will facilitate correspondence by stating experience, references and wages expected. Address W. D. S., 1929 North Main Ave., Scranton, Pa.

SHEET METAL WORKERS

WANTED

Experienced sheet iron workers and tinsmiths on head light cases. Apprentices taken on trial. STAR HEAD LIGHT COMPANY, Rochester, N. Y.

PLATERS AND POLISHERS

WANTED

FOREMAN PLATER for Chicago, familiar with all modern methods and finishes, required for builders' hardware. Must thoroughly understand enameling, electro galvanizing, lacquering, as well as plating, polishing and buffing. In reply give full information as to age, where previously employed, wages wanted, etc. Address CHICAGO PLATER, care THE METAL INDUSTRY.

SITUATIONS OPEN—Continued

PLATERS AND POLISHERS—Continued

WANTED

By large Automobile Manufacturer an Assistant General Foreman for Polishing, Grinding and Nickel Plating Departments. Exceptional opportunity for the right man. Must thoroughly understand the business and be a good executive. Married man preferred. State age and give full particulars regarding experience, names of firms worked for and present employer. Applications will be considered confidential if so requested. Address AUTO POLISHING, care of THE METAL INDUSTRY.

WANTED

Experienced PLATER at once,

THE WESTERN HINGE & MFG. CO.,

LEAVENWORTH, KANSAS.

COMPOSITION MAKER

WANTED

A Practical and Experienced Man in the manufacture of rouges and all kinds of polishing compositions, capable of taking charge of a factory in a large city south of Philadelphia. Address POLISHING COMPOSITIONS, care THE METAL INDUSTRY.

SITUATIONS WANTED

Undisplayed Advertisements Under This Heading 50 Cents Each Insertion
Displayed Advertisements $1.50 per inch each insertion

EXECUTIVE

SITUATION WANTED.—As SUPERINTENDENT or FOREMAN in the manufacturing of SILVER, BRONZE, BRASS, also soft metal, ornamental and novelty goods. Have had 20 years' experience. Well able to handle help. Excellent references. Address C De H, care THE METAL INDUSTRY.

PROFESSIONAL

SITUATION WANTED—METALLURGIST and CHEMIST with wide experience in the manufacture of German Silver, Brass, Bronze and Phosphor Bronze. Expert Analyst. Address EXPERT ANALYST, care THE METAL INDUSTRY.

SITUATION WANTED—Student of fourth year COOPER UNION Evening Chemical School, with thorough knowledge of inorganic chemistry, qualitative and quantitative analyses and general laboratory work, wishes to begin with a manufacturing concern where advancement is assured. Can furnish the best of reference. Address S. EDELSON, 1569 Fulton avenue, Bronx, New York.

FOUNDERS

SITUATION WANTED by brass foundry foreman, experienced in plumbers' and steamfitters' supplies, builders' hardware and general jobbing; also mixing and handling all metals. Address R. F. D., care THE METAL INDUSTRY.

SITUATION WANTED—Brass Foundry Foreman, at present employed, wants to make a change. Well up on modern foundry practice, a hustler and would invest money in a sound concern if desired. Address B. F. J., care THE METAL INDUSTRY.

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SITUATIONS WANTED—Continued

FOUNDERS—Continued

SITUATION WANTED—By a progressive, up-to-date BRASS FOUNDRY FOREMAN, 20 years' experience in all branches of the best foundry practice. Can keep down costs and increase production. Would like to hear from an up-to-date firm requiring the services of a Practical Foreman. First-class references can be furnished, and can accept a position on short notice. Address PROGRESSIVE, care THE METAL INDUSTRY.

EXPERT on FOUNDING, ALLOYING and CASTING OF BRASS, BRONZE AND ALUMINUM, desires position as foreman with progressive concern that would appreciate the services of an up-to-date foundryman. Address "FOUNDRY EXPERT," care THE METAL INDUSTRY.

SITUATION WANTED—By a PLASTER COMPOSITION FOUNDRYMAN with 9 years' experience at fine arts castings in metals, plaster, wax and glue; also for patterns for engraving machines. Address P. C. F., care THE METAL INDUSTRY.

BRASS FINISHER

SITUATION WANTED—FOREMAN BRASS FINISHER. Experienced in the manufacture of plumbers' and steamfitters' supplies, specialty work and jobbing. Can handle help to advantage and am familiar with up-to-date methods. I have had 20 years' experience and can furnish good references as to my ability. Address SPECIALTY WORK, care THE METAL INDUSTRY.

PLATERS AND POLISHERS

SITUATION WANTED.—By a progressive, up-to-date foreman plater; thoroughly understands all solutions and finishes and the making of lacquers. Address PROVIDENCE, care of THE METAL INDUSTRY.

SITUATION WANTED—By a first-class POLISHER and BUFFER; 15 years' experience with largest manufacturers in the country. Can furnish the best of references. Address BRONX, care THE METAL INDUSTRY.

SITUATION WANTED—By FOREMAN PLATER who is also capable of handling a Polishing Room. Thoroughly understands all solutions and can furnish the best of references. Address PHILIP, care THE METAL INDUSTRY.

PLATERS AND POLISHERS—Continued

Electro-Platers

Any one desiring the services of first class men for the electrodeposition of metals and finishing in all branches and departments of the plating business can secure such services by corresponding with the Secretary of the National Electro-Platers' Association, Royal F. Clark, 246 Fulton Avenue, Jersey City, N. J.

SITUATION WANTED—By a PLATER with steady, sober habits, not afraid of work. Can produce any color on the market and can furnish the best of references. Master of all the latest bright finishes. Address WORKER, care THE METAL INDUSTRY.

SITUATION WANTED.—PLATER, expert on all up-to-date finishes, desires position. O. R. C., care THE METAL INDUSTRY.

SITUATION WANTED—As ASSISTANT TO FOREMAN PLATER. First-class man on BUILDERS' HARDWARE, my experience dating back to 1888. Can make all solutions and am an expert oxidizer. Address D-8, care THE METAL INDUSTRY.

SITUATION WANTED by a FOREMAN Plater who thoroughly understands silver and gold solutions and finishes. Address L. G. J., care THE METAL INDUSTRY.

SITUATION WANTED as FOREMAN PLATER who understands quantity and quality in all finishes. Has worked at gold, silver, nickel and brass plating. Can furnish best of references. Address ALBANY, care THE METAL INDUSTRY.

SITUATION WANTED—By a first-class plater, thoroughly familiar with all solutions but gold. Would like to secure a position in or around New York City. Address NO GOLD, care THE METAL INDUSTRY.

SITUATION WANTED—By a FOREMAN PLATER who thoroughly understands the plating business from A to Z. Has had several years' experience and is capable of taking charge. Address P. H., care THE METAL INDUSTRY.

A PARTIAL LIST OF THE PRINCIPAL ARTICLES PUBLISHED IN THE METAL INDUSTRY DURING 1912

ADVERTISERS' PRODUCTS AND BUYERS' GUIDE

Abrasives
Williamsville Buff Mfg. Co., Danielson, Conn.

Accumulators, Hydraulic
Waterbury (Conn.) Farrel Foundry & Machine Co.
Watson-Stillman Co., New York.
Wood, R. D., & Co., Philadelphia, Pa.

Acid, Hydrofluoric (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Cooper, Charles, & Co., New York.
General Chemical Co., Philadelphia, Pa.
Kalbfleisch, Franklin H., Co., New York.
McKesson & Robbins, New York.
Wiarda & Co., John C., Brooklyn, N. Y.

Acid, Muriatic (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Cooper, Charles, & Co., New York.
Grasselli Chemical Co., Cleveland, O.
Niagara Alkali Co., Niagara Falls, N. Y.

Acid, Nitric.
Grasselli Chemical Co., Philadelphia, Pa.
Kalbfleisch, Franklin H., Co., New York.

Acid, Sulphuric (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Cooper, Charles, & Co., New York.
Grasselli Chemical Co., New York.
Illinois Zinc Co., Peru, Ill.
Kalbfleisch, Franklin H., Co., New York.
Matthiesen & Hegeler Zinc Co., La Salle, Ill.
McKesson & Robbins, New York.

Air Brushes and Accessories.
Eclipse Air Brush & Compressor Co., Newark, N. J.
Eureka Pneumatic Spray Co., New York.

Air Compressors.
Eclipse Air Brush & Compressor Co., Newark, N. J.
Eureka Pneumatic Spray Co., New York.
Leiman Bros., New York.
Nicholls, W. H., New York.
Pangborn, Thomas W., Co., Hagerstown, Md.

Air Filters.
Eclipse Air Brush & Compressor Co., Newark, N. J.
Eureka Pneumatic Spray Co., New York.

Alloys Made to Specifications.
Ajax Metal Co., Philadelphia, Pa.
Allan, A., & Son, New York.
American Manganese Bronze Co., New York.
Atkinson Co., The, Rochester, N. Y.
Birkenstein, S., & Sons, Chicago, Ill.
Columbia Smelting & Refining Works, New York.
Damascus Bronze Co., Pittsburg, Pa.
Electric Smelting and Alum'n Co., Lockport, N. Y.
Fitz, Dana & Co., Boston, Mass.
Genesee Metal Co., Rochester, N. Y.
Lang, R. F., New York.
Leavitt, C. W., & Co., New York.
Michigan Smelting & Refining Co., Detroit, Mich.
North-American Smelting Co., Philadelphia, Pa.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Aluminum Alloys.
Birkenstein, S., & Sons, Chicago, Ill.
Electric Smelting & Alum'n Co., Lockport, N. Y.
Fitz, Dana & Co., Boston, Mass.
North American Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
U. S. Reduction Co., Chicago, Ill.

Aluminum Bronze Ingots.
Electric Smelting & Alum'n Co., Lockport, N. Y.

Aluminum Castings.
Aluminum Company of America, Pittsburg, Pa.
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Atkinson Co., The, Rochester, N. Y.
Light Foundry & Mfg. Co., Pottstown, Pa.

Aluminum Electrical Conductors.
Aluminum Company of America, Pittsburg, Pa.

Aluminum, Granulated
U. S. Reduction Co., Chicago, Ill.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Aluminum Ingots.
Aluminum Company of America, Pittsburg, Pa.
Birkenstein, S., & Sons, Chicago, Ill.
Electric Smelting & Alum'n Co., Lockport, N. Y.
Foreign & Domestic Metals Co., Cleveland, O.
Kemp, W. H., Co., New York.
Leavitt, C. W., & Co., New York.
Michigan Smelting & Refining Co., Detroit, Mich.
Richards & Co., Boston, Mass.
Standard Rolling Mills Inc., Brooklyn, N. Y.
Trotter, Nathan, & Co., Philadelphia, Pa.
U. S. Reduction Co., Chicago, Ill.

Aluminum Powder, Leaf and Foil.
Kemp, W. H., Co., New York.

Aluminum Manufactured Goods, Sheet
(See also Metal Goods made to order.)
Aluminum Goods Mfg. Co., Manitowoc, Wis.

Aluminum Moldings and Extruded Shapes.
Aluminum Company of America, Pittsburg, Pa.

Aluminum Rivets.
Hassall, John, Inc., Brooklyn, N. Y.
Kemp, W. H., Co., New York.

Aluminum Sheets, Rods and Wire.
Aluminum Company of America, Pittsburg, Pa.
Electric Smelting & Alum'n Co., Lockport, N. Y.
Kemp, W. H., Co., New York.
Pilling Brass Co., Waterbury, Conn.
Richards & Co., Boston, Mass.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Aluminum Solder (See Solder.)

Aluminum Tubes.
Aluminum Co. of America, Pittsburg, Pa.
Kemp, W. H., Co., New York.

Ammeters and Voltmeters (See also Platers' Supplies).
Bristol Co., The, Waterbury, Conn.
Hanson & Van Winkle Co., Newark, N. J.
Sangamo Electric Co., Springfield, Ill.
United States Chemical Co., Cleveland, O.

Amyl Acetate (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Barrett, M. L., & Co., Chicago, Ill.
Cooper, Charles, & Co., New York.
McKesson & Robbins, New York.
Nicholas, G. J., & Co., Chicago, Ill.
Wiarda & Co., John C., Brooklyn, N. Y.

Annealing Muffles.
Monarch Engineering & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.

Annealing Pans.
Ohio Mfg. Co., Painesville, O.
Sly, W. W., Mfg. Co., Cleveland, O.

Anodes, Gold or Silver.
Hanson & Van Winkle Co., Newark, N. J.
Jackson, John J., & Co., Newark, N. J.

Anodes, Brass or Copper (See also Platers' Supplies).
Backus & Leeser Co., New York.
Bridgeport Brass Co., Bridgeport, Conn.
Hanson & Van Winkle Co., Newark, N. J.
Hussey, C. G., & Co., Pittsburg, Pa.
Munning-Loeb Co., Matawan, N. J.
Seymour Manufacturing Co., The, Seymour, Conn.
Stevens, Frederic B., Detroit, Mich.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.
Wiarda & Co., John C., Brooklyn, N. Y.

Anodes, Nickel (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Backus & Leeser Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
McKesson & Robbins, New York.
Moyer, D. B., Detroit, Mich.
Munning-Loeb Co., Matawan, N. J.
Neubeck, Adolf, New York.
Seymour Manufacturing Co., The, Seymour, Conn.
Stevens, Frederic B., Detroit, Mich.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.
Wiarda & Co., John C., Brooklyn, N. Y.

Anodes, Platinum (See also Platers' Supplies).

Anodes, Silver (See also Platers' Supplies).
Jackson, John J., Newark, N. J.
Renziehausen, Wm. F., Co., Newark, N. J.

Anodes, Zinc (See also Platers' Supplies).
Grasselli Chemical Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.
Wiarda & Co., John C., Brooklyn, N. Y.

Antimonial Lead.
Leavitt, C. W., & Co., New York.
North American Smelting Co., Philadelphia, Pa.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Antimony Metal.
Birkenstein, S., & Sons, Chicago, Ill.
Cooper, Charles, & Co., New York.
Fitz, Dana & Co., Boston, Mass.
Foreign & Domestic Metals Co., Cleveland, O.
Hendricks Bros., New York.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.
Michigan Smelting & Refining Co., Detroit, Mich.
Richards & Co., Boston, Mass.
Trotter, Nathan, & Co., Philadelphia, Pa.
U. S. Reduction Co., Chicago, Ill.
Wiarda & Co., John C., Brooklyn, N. Y.

Assayers and Chemists.
Krom, L. J., New York.
Ledoux & Co., New York.
Thompson, Hugh L., Waterbury, Conn.

Automatic Buffing and Polishing Machines
Automatic Buffing Machine Co., Buffalo, N. Y.
Baltimore Tube Co., Baltimore, Md.

Automatic Disc Polishing Machines.
Baltimore Tube Co., Baltimore, Md.

Automatic Drop Lifters.
Peck Drop Press Works, New Haven, Conn.

Automatic Wire and Metal Working Machinery
Baird Machine Co., Bridgeport, Conn.
Blake & Johnson Co., Waterbury, Conn.
Bliss, E. W., Brooklyn, N. Y.
Farrel Foundry & Machine Co., Ansonia, Conn.
Shuster, F. B., Co., New Haven, Conn.
Waterbury Farrel Foundry & Machine Co., Waterbury, Conn.

Babbitt Metals.
Ajax Metal Co., Philadelphia, Pa.
American Manganese Bronze Co., New York.
Atkinson Co., The, Rochester, N. Y.
Benson, H. K. & F. S., Glen Ridge, N. J.
Birkenstein, S., & Sons, Chicago, Ill.
Columbia Smelting & Refining Works, New York.
Damascus Bronze Co., Pittsburg, Pa.
Electric Smelt. & Aluminum Co., Lockport, N. Y.
Fitz, Dana & Co., Boston, Mass.
Merchant & Evans Co., Philadelphia, Pa.
Michigan Smelting & Refining Co., Detroit, Mich.
North American Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.

Bakelite.
General Bakelite Co., New York.

Balls, Steel, for Burnishing
Abbott Ball Co., Hartford, Conn.
Baird Machine Co., Bridgeport, Conn.
Globe Machine & Stamping Co., Cleveland, O.

Barium Cyanide
Berkel, Wm., Chemical Works, Jersey City, N. J.

Belt Lacing, Metallic.
Bristol Co., The, Waterbury, Conn.

Belts, Polishing.
Ames Sword Co., Chicopee, Mass.
Hanson & Van Winkle Co., Newark, N. J.

Bends and Coils, Brass, Copper, Iron.
Baltimore Tube Co., Baltimore, Md.

Bismuth.
Cooper, Charles & Co., New York.
Fitz, Dana & Co., Boston, Mass.
Hendricks Brothers, New York.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.
Michigan Smelting & Refining Co., Detroit, Mich.
Richards & Co., Boston, Mass.
Trotter, Nathan, & Co., Philadelphia, Pa.

Block Tin (See Tin).

Block Tin Pipe.
North American Smelting Co., Philadelphia, Pa.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Blowers and Blow Piping
Cleveland Blow Pipe & Mfg. Co., Cleveland, O.
Kirk & Blum, Cincinnati, O.
Knickerbocker Company, Jackson, Mich.
Leiman Bros., New York.
Roth Bros. & Co., Chicago, Ill.

Bower-Barffing
Flavell, A. E., New Britain, Conn.

Brass and Bronze Architectural Work.
Manhattan Brass Co., New York.

Brass and Bronze Covered Iron Tubes.
Phenix Tube Co., Brooklyn, N. Y.

Brass Castings.
Ajax Metal Co., Philadelphia, Pa.
American Manganese Bronze Co., New York.
Atkinson Co., The, Rochester, N. Y.
Damascus Bronze Co., Pittsburg, Pa.
North American Smelting Co., Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Schroeder, Edw., Lamp Works, Jersey City, N. J.

Brass Ingots.
Ajax Metal Co., Philadelphia, Pa.
American Manganese Bronze Co., New York.
Birkenstein, S., & Sons, Chicago, Ill.
Damascus Bronze Co., Pittsburg, Pa.
Genesee Metal Co., Rochester, N. Y.
Illinois Smelting & Refining Co., Chicago, Ill.
Merchant & Evans Co., Philadelphia, Pa.
Michigan Smelting & Refining Co., Detroit, Mich.
North American Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Taunton-New B'f'd Copper Co., New Bedford, Mass.
Walsh's Sons, M. I., & Co., Newark, N. J.
White & Bro., Inc., Philadelphia, Pa.

Brass, Bronze, Copper and Oreide Sheet Wire, Rod, Etc.
American Brass Co., The, Waterbury, Conn.
American Manganese Bronze Co., New York.
Benson, H. K. & F. S., Glen Ridge, N. J.
Bridgeport Brass Co., Bridgeport, Conn.
Damascus Bronze Co., Pittsburg, Pa.
Hendricks Bros., New York.
Hussey, C. G., & Co., Pittsburg, Pa.
Manhattan Brass Co., New York.
Merchant & Evans Co., Philadelphia, Pa.
Pilling Brass Co., Waterbury, Conn.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Scovill Manufacturing Co., Waterbury, Conn.
Seymour Manufacturing Co., The, Seymour, Conn.
Taunton-New B'f'd Copper Co., New Bedford, Mass.

Brass, Bronze, Copper and Oreide Tubes.
American Brass Co., The, Waterbury, Conn.
Baltimore Tube Co., Baltimore, Md.
Bridgeport Brass & Copper Co., The, New York.
Manhattan Brass Co., New York.
Merchant & Evans Co., Philadelphia, Pa.

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Phenix Tube Co., Brooklyn, N. Y.
Riverside Metal Co., Riverside, N. J.
Scovill Manufacturing Co., Waterbury, Conn.
Seymour Manufacturing Co., The, Seymour, Conn.
Wells, A. H., Co., Waterbury, Conn.

Brass Foundry Equipment
(See Foundry Supplies and Equipment).

Brass Goods, Plumbers'
Atkinson Co., The, Rochester, N. Y.
Bridgeport Brass Co., Bridgeport, Conn.
Manhattan Brass Co., New York.
Schroeder, Edw., Lamp Works, Jersey City, N. J.
Baltimore Tube Co., Baltimore, Md.

Brazing Solder (See Solder).

Britannia Metal.
Benson, H. K. & F. S., Glen Ridge, N. J.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Bronze Ingots and Castings.
Ajax Metal Co., Philadelphia, Pa.
Allan, A., & Son, New York.
American Manganese Bronze Co., New York.
American Brass Co., The, Waterbury, Conn.
Atkinson Co., The, Rochester, N. Y.
Damascus Bronze Co., Pittsburg, Pa.
Fitz, Dana & Co., Boston, Mass.
Genesee Metal Co., Rochester, N. Y.
Lang, R. F., New York.
North American Smelting Co., Philadelphia, Pa.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Taunton-New B'f'd Copper Co., New Bedford, Mass.

Bronze Sheets, Wire, Rods, Etc. (See Brass, Bronze and Copper Sheets, etc.).

Bronze Tubes (See Brass, Bronze and Copper Tubes).

Brushes, Wire and Bristle (See also Foundry Supplies and Platers' Supplies).
Blumenthal, Hermann, New York.
Hanson & Van Winkle Co., Newark, N. J.
Osborn Manufacturing Co., Cleveland, O.
Paxson, J. W., Co., Philadelphia, Pa.

Buckle Machinery. (See Automatic Wire and Metal Working Machinery).

Buckle Tongues.
Campbell-Warner Co., Middletown, Conn.

Buffing Compositions (See also Platers' Supplies).
Zucker, Geo., Co., Newark, N. J.

Buffing Lathes. (See Polishing, Buffing and Burnishing Machinery).

Buffing Machinery. (See Polishing, Buffing and Burnishing Machinery).

Buffing and Polishing Supplies (See Polishing and Buffing Machinery and Equipment).

Buffing and Polishing Wheels (See also Platers' Supplies).
Stevens, Frederic B., Detroit, Mich.
Williamsville Buff Mfg. Co., Danielson, Conn.

Buffing Wheels, Leather for
Dahm & Kiefer Tanning Co., Chicago, Ill.

Bull-Dozers
Wood, R. D., & Co., Philadelphia, Pa.

Burners, Fuel Oil or Gas (See also Foundry Supplies).
Monarch Eng. & Mfg. Co., Baltimore, Md.
Pangborn, Thomas W., Co., Hagerstown, Md.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.

Burnishing Barrels (See also Platers' Supplies).
Abbott Ball Co., Hartford, Conn.
Baird Machine Co., Bridgeport, Conn.
Globe Machine & Stamping Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
Smith & Richardson, Attleboro, Mass.
Tolhurst Machine Works, Troy, N. Y.

Burnishing Barrels, Leather Mealfor
Dahm & Kiefer Tanning Co., Chicago, Ill.
Peckham Mfg. Co., Newark, N. J.

Burnishing Compounds and Chips (See also Platers' and Polishers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
International Chemical Co., Camden, N. J.
Stevens, Frederic B., Detroit, Mich.

Button Machinery. (See Automatic Wire and Metal Working Machinery).

Cabbaging Presses.
Farrel Foundry & Machine Co., Ansonia, Conn.
Wood, R. D., & Co., Philadelphia, Pa.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Watson Stillman Co., New York.

Cadmium, Metallic
Cooper, Charles, & Co., New York.
Grasselli Chemical Co., New York.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.
Richards & Co., Boston, Mass.

Carboy Rockers.
Rockhill & Vietor, New York.

Castings. (See also name of metal wanted).

Castings, Iron Machinery
Bliss Co., E. W., Brooklyn, N. Y.
Farrel Foundry & Machine Co., Ansonia, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Wood, R. D., & Co., Philadelphia, Pa.

Caustic Potash (See Platers', Polishers' and Galvanizers' Supplies).

Centrifugal Dryers and Extractors
American Tool & Machine Co., Boston, Mass.
Hanson & Van Winkle Co., Newark, N. J.
No Dust Drying Machine Co., Providence, R. I.
Tolhurst Machine Works, Troy, N. Y.

Chain Machinery. (See Automatic Wire and Metal Working Machinery).

Chaplets, Perforated (See Foundry Supplies).

Charcoal, Powdered and Granulated.
MacKellar's, R., Sons Co., Peekskill, N. Y.
Paxson, J. W., Co., Philadelphia, Pa.

Charcoal Facings.
MacKellar's, R., Sons Co., Peekskill, N. Y.

Chemicals (See Platers' Supplies).

Chemists (See Assayers & Chemists).

Chucks.
American Tool & Machine Co., Boston, Mass.

Chucks, Spinning
Bliss, E. W. Co., Brooklyn, N. Y.
Pryibil, P., New York.

Cinder Mills. (See Crushers).

Cleaning Compounds, Metal (See also Platers' Supplies).
Anthony, H. M., & Co., New York.
Apothecaries Hall Co., Waterbury, Conn.
Backus & Leeser Co., New York.
Cleveland Platers' Supply Co., Cleveland, O.
Electric Smelt. & Aluminum Co., Lockport, N. Y.
Hanson & Van Winkle Co., Newark, N. J.
International Chemical Co., Camden, N. J.
Munning-Loeb Co., Matawan, N. J.
Stevens, Frederic B., Detroit, Mich.
Swan & Finch Co., New York.
Wiarda & Co., John C., Brooklyn, N. Y.
Zucker & Levett & Loeb Co., New York.

Clutches, Friction
Carlyle Johnson Machine Co., Manchester, Conn.

Composition Metal Ingots and Castings.
Ajax Metal Co., Philadelphia, Pa.
Allan, A., & Son, New York.
American Manganese Bronze Co., New York.
Damascus Bronze Co., Pittsburg, Pa.
Eastern Metal & Refining Co., Boston, Mass.
Fitz, Dana & Co., Boston, Mass.
North American Smelting Co., Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
White & Bro., Inc., Philadelphia, Pa.

Composition Metal Tacks, Nails, Etc.
Hussey, C. G., & Co., Pittsburg, Pa.

Consulting Engineers, Rolling Mill
Thompson, Hugh L., Waterbury, Conn.

Consulting Platers. (See Expert Instruction).

Conveyors.
Nicholls, Wm. H., New York.
Pangborn, Thomas W., Co., Hagerstown, Md.

Copper Bearing Material, Buyers of (See Metal Turnings, Drosses, Residues, Etc.).

Copper, Carbonate of
Apothecaries Hall Co., Waterbury, Conn.
Cooper, Charles, & Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
Wiarda & Co., John C., Brooklyn, N. Y.

Copper Castings.
Ajax Metal Co., Philadelphia, Pa.
American Manganese Bronze Co., New York.
Atkinson Co., The, Rochester, N. Y.

Copper Ingots.
Balbach Smelting & Refining Co., Newark, N. J.
Birkenstein, S., & Sons, Chicago, Ill.
Fitz, Dana & Co., Boston, Mass.
Foreign & Domestic Metals Co., Cleveland, O.
Hendricks Brothers, New York.
Lang, R. F., New York.
Leavitt, C. W., & Co., New York.
Merchant & Evans Co., Philadelphia, Pa.
Michigan Smelting & Refining Co., Detroit, Mich.
North American Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Standard Rolling Mills Inc., Brooklyn, N. Y.
Taunton-New B'f'd Copper Co., New Bedford, Mass.
Trotter, Nathan, & Co., Philadelphia, Pa.
United Metals Selling Co., New York.
Vogelstein, L., & Co., New York.
White & Bro., Inc., Philadelphia, Pa.

Copper Nails and Tacks.
Hassall, John, Inc., New York.
Hussey, C. G., & Co., Pittsburg, Pa.
Scovill Manufacturing Co., Waterbury, Conn.
Taunton-New B'f'd Copper Co., New Bedford, Mass.

Copper Rivets.
Hassall, John, Inc., New York.
Hendricks Bros., New York.

Copper Sheets, Wire, Rods, Bolts, Etc. (See Brass, Bronze and Copper Sheets, etc.).

Copper, Shot
Riverside Metal Co., Riverside, N. J.
Seymour Manufacturing Co., Seymour, Conn.

Copper, Sulphate of
Apothecaries Hall Co., Waterbury, Conn.
Grasselli Chemical Co., Cleveland, O.

Copper Tubes (See Brass and Copper Tubes).

Core Compound (See also Foundry Supplies).
Dixon, Jos., Crucible Co., Jersey City, N. J.
Paxson, J. W., Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.

Core Machines and Core Tapering Machine (See also Foundry Supplies).
Nicholls, W. H., New York.
Pangborn, Thomas W., Co., Hagerstown, Md.

Core Oil. (See Core Compound).

Core Ovens (See also Foundry Supplies).
Gebnrich, Hermann, New York.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Nicholls, Wm. H., New York.
Osborn Mfg. Co., Cleveland, O.
Oven Equipment & Mfg. Co., New Haven, Conn.
Pangborn, Thomas W., Co., Hagerstown, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Rockwell Furnace Co., New York.
Smith, J. D., Foundry & Supply Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.

Corrugated Tubing, Brass.
Baltimore Tube Co., Baltimore, Md.

Cosiettizing.
Flavell, A. E., New Britain, Conn.

Cranes.
Rockwell Furnace Co., New York.

Crucibles, Stirrers, Stoppers, Nozzles, Etc. (See also Foundry Supplies).
Bartley, Jonathan, Crucible Co., Trenton, N. J.
Dixon, Jos., Crucible Co., Jersey City, N. J.
Gautier, J. H., & Co., Jersey City, N. J.
McCullough-Dalzell Crucible Co., Pittsburg, Pa.
Ross-Tacony Crucible Co., Philadelphia, Pa.
Taylor, R. J., Inc., Philadelphia, Pa.

Crushers, Cinder (See also Foundry Supplies)
Farrel Foundry & Machine Co., Ansonia, Conn
Moussette, O. J., Co., Brooklyn, N. Y.
Nicholls, Wm. H., New York.
Osborn Mfg. Co., Cleveland, O.
Paxson, J. W., Co., Philadelphia, Pa.
Sly, W. W., Mfg. Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Cupolas.
Paxson, J. W., Co., Philadelphia, Pa.

Cyanide of Potassium (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Cooper, Charles, & Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
McKesson & Robbins, New York.
Roessler & Hasslacher Chemical Co., New York.
Wiarda & Co., John C., Brooklyn, N. Y.

Cyanide of Sodium.
Hanson & Van Winkle Co., Newark, N. J.
Roessler & Hasslacher Chemical Co., New York.

Die-Castings.
Finished Parts Mfg. Co., Newark, N. J.

Dies, Sheet Metal Working
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N. Y.
Globe Machine & Stamping Co., Cleveland, O.
Toledo Metal Spinning Co., Toledo, O.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Disc Polishing Machines.
Baltimore Tube Co., Baltimore, Md.

Draw Benches—Wire, Rod and Tube
Farrel Foundry & Machine Co., Ansonia, Conn.
Leiman Bros., New York.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
Torrington Mfg. Co., Torrington, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Watson-Stillman Co., New York.
Wood, R. D., & Co., Philadelphia, Pa.

Drosses (See Metal Turnings, Drosses, etc.).

Drop Hammers.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Drying-Out Machines.
Baird Machine Co., Bridgeport, Conn.
No-Dust Drying Machine Co., Providence, R. I.
Smith & Richardson, Attleboro, Mass.
Tolhurst Machine Works, Troy, N. Y.
Torrington Mfg. Co., Torrington, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Dust Collectors and Ventilating Systems.
Cleveland Blow Pipe & Mfg. Co., Cleveland, O.
Kirk & Blum, Cincinnati, O.
Knickerbocker Co., The, Jackson, Mich.
Leiman Bros., New York.
Pangborn, Thomas W., Co., Hagerstown, Md.
Sly, W. W., Mfg. Co., Cleveland, O.

Dynamos, Platers' and Galvanizers' (See also Platers' Supplies).
Backus & Leeser Co., New York.
Bennett-O'Connell Co., Chicago, Ill.

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Bogue, Chas. J., Electric Co., New York.
Canning, W., Co., Birmingham, England.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Hanson & Van Winkle Co., Newark, N. J.
Leiman Bros., New York.
L'Hommedieu, C. F., & Sons, Chicago, Ill.
Moyer, D. B., Detroit, Mich.
Munning-Loeb Co., Matawan, N. J.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
Stevens, Frederic B., Detroit, Mich.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Electric Cleaning Compounds (See Cleaning Compounds, Metal).

Electrochroma Solutions.
Rojas Electro Chemical Co., New York.

Electrogalvanizing Machines (See Galvanizing Barrels and Apparatus).

Electrolytically Deposited Engine Manifolds
Baltimore Tube Co., Baltimore, Md.

Electroplaters' Centrifugal Dryers
No Dust Drying Machine Co., Providence, R. I.
Tolhurst Machine Works, Troy, N. Y.

Electroplating Apparatus, Mechanical
(See Plating Barrels and Apparatus).

Electroplating, Polishing, Coloring, Etc.
Hassall, John, Inc., Brooklyn, N. Y.
Northern Ohio Mfg. & Refg. Works, Cleveland, O.
Rojas Electro-Chemical Co., New York.
Waterbury Metal Products Co., Waterbury, Conn.

Emery (See also Platers' Supplies).
Williamsville Buff Mfg. Co., Danielson, Conn.

Emery Wheels (See also Grinding Machinery, Etc.).
Williamsville Buff Mfg. Co., Danielson, Conn.

Enameling Ovens.
Gehnrich, Hermann, New York.
Monarch Engineering & Mfg. Co., Baltimore, Md.
Oven Equipment & Mfg. Co., New Haven, Conn.
Rockwell Furnace Co., New York.
Steiner, E. E., Newark, N. J.

Engineers, Mechanical, Foundry, Etc.
Pangborn, Thomas W., Co., Hagerstown, Md.
Smith, J. D., Foundry Supply Co., Cleveland, O.

Escutcheon Pins, All Metals
Hassall, John, New York.

Etched Name Plates.
Schweizer, Max, Bridgeport, Conn.

Exhaust Fans.
Cleveland Blow Pipe & Mfg. Co., Cleveland, O.
Leiman Bros., New York.
Pangborn, Thomas W., Co., Hagerstown, Md.
Roth Bros. & Co., Chicago, Ill.

Expert Instruction Plating, Coloring, Dipping Etching, Etc.
Flavell, A. E., New Britain, Conn.
Rojas Electro-Chemical Co., New York.
Schneider, Wm., New York.
Schweizer, Max, Bridgeport, Conn.

Extractors, Centrifugal Drying
American Tool & Machine Co., Boston, Mass.
Tolhurst Machine Works, Troy, N. Y.

Facings (See Foundry Facings).

Fig Cleanser.
International Chemical Co., Camden, N. J.

Fillets, Leather (See Foundry Supplies and Equipment).

Fire Brick (See also Foundry Supplies).
Stevens, Frederic B., Detroit, Mich.

Flasks, Brass Molders' (See also Foundry Supplies).
Arcade Mfg. Co., Freeport, Ill.
Middlediteh, Benj., Detroit, Mich.
Morner & Smith, Dayton, O.
Nichols, W. H., New York.
Osborn Mfg. Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.

Flavellite Rust-Proofing
A. E. Flavell, New Britain, Conn.

Flexible Tubing.
Baltimore Tube Co., Baltimore, Md.

Fluxes, Soldering and Tinning
Grasselli Chemical Co., Cleveland, O.
Richards & Co., Boston, Mass.

Forming Machines (See Automatic Wire and Metal Working Machinery).

Forgings, Automobile
American Manganese Bronze Co., New York.
Bliss, E. W., Co., Brooklyn, N. Y.
Phosphor Bronze Smelting Co., Philadelphia, Pa.

Foundry Facings (See also Foundry Supplies).
Dixon, Jos., Crucible Co., Jersey City, N. J.
MacKellar's, R., Sons Co., Peekskill, N. Y.
McKesson & Robbins, New York.
Paxson, J. W., Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.

Foundry Flour. (See Foundry Facings).

Foundry Pails, Kegs, Etc.
Ohio Mfg. Co., Painesville, O.
Sly, W. W., Mfg. Co., Cleveland, O.

Foundry Supplies and Equipment. (See also Foundry Facings, Furnaces, Etc.).
Arcade Mfg. Co., Freeport, Ill.
Birkenstein, S., & Sons, Chicago, Ill.
Dixon, Jos., Crucible Co., Jersey City, N. J.
Ideal Furnace Co., Chester, Pa.
Kroeschell Bros. Co., Chicago, Ill.
MacKellar's, R., Sons Co., Peekskill, N. Y.
Monarch Engineering & Mfg. Co., Baltimore, Md.
Morner & Smith, Dayton, O.
Moussette, O. J., Co., Brooklyn, N. Y.
Nicholls, Wm. H., New York.
Osborn Mfg. Co., Cleveland, O.
Pangborn, Thomas W., Co., Hagerstown, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.
Smith, J. D., Foundry Supply Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.
Waverly Oil Works Co., Pittsburgh, Pa.

Friction Clutches
Carlyle-Johnson Machine Co., Manchester, Conn.

Fuel Oil
Waverly Oil Works Co., Pittsburgh, Pa.

Furnace Linings (See also Foundry Supplies).
Kroeschell Bros. Co., Chicago, Ill.
Monarch Engineering & Mfg. Co., Baltimore, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Rockwell Furnace Co., New York.
Stevens, Frederic B., Detroit, Mich.

Furnaces, Annealing, Brazing, Etc.
Monarch Eng. Mfg. Co., Baltimore, Md.
Rockwell, W. S., Co., New York.
Rockwell, W. S., Co., New York.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Furnaces, Crucible (See Furnaces, Melting).

Furnaces, Electric
Bristol Co., The, Waterbury, Conn.

Furnaces, Galvanizing and Tinning
Farrel Foundry & Machine Co., Ansonia, Conn.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.

Furnaces, Melting, for Oil, Coal, Coke, or Gas (See also Foundry Supplies).
Ideal Furnace Co., Chester, Pa.
Kroeschell Bros. Co., Chicago, Ill.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.
Smith, J. D., Foundry Supply Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.

Furnaces, Reverberatory
Monarch Engineering & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.
Rockwell, W. S., Co., New York.

Fusel Oil, Refined (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Barrett, M. L., & Co., Chicago, Ill.
Cooper, Charles, & Co., New York.
McKesson & Robbins, New York.
Nikolas, G. J., & Co., Chicago, Ill.
Wlarda & Co., John C., Brooklyn, N. Y.

Galvanized Specialties, Nails, Screws, Etc.
Hassall, John, Inc., Brooklyn, N. Y.
The Meaker Co., Chicago, Ill.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Galvanizing Plants and Equipment (See also Platers' and Polishers' Supplies).
Globe Machine & Stamping Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
Meaker Co., Chicago, Ill.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Galvanizing Barrels and Automatic Devices.
Globe Machine & Stamping Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
Meaker Co., Chicago, Ill.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Galvanizing for the Trade.
Hassall, John, Inc., Brooklyn, N. Y.
The Meaker Co., Chicago, Ill.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Gas Producers and Power Plants
Wood, R. D., & Co., Philadelphia, Pa.

German Silver Ingots, Castings, Etc.
Riverside Metal Co., Riverside, N. J.
Seymour Manufacturing Co., The, Seymour, Conn.

German Silver Sheets, Wire, Rods, Tubes, Etc
Bridgeport Brass Co., Bridgeport, Conn.
Pilling Brass Co., Waterbury, Conn.
Riverside Metal Co., Riverside, N. J.
Scovill Manufacturing Co., Waterbury, Conn.
Seymour Manufacturing Co., The, Seymour, Conn.

Gold Alloys.
Riverside Metal Co., Riverside, N. J.

Gold Anodes (See Anodes).

Gold, Chloride of
Cooper, Charles, & Co., New York.

Gold Ingots, Bars, Plates, Etc.
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Gold and Silver Refiners.
Jackson, John J., Co., Newark, N. J.
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Graphite (See Foundry Supplies).

Grinding Machinery.
Baltimore Tube Co., Baltimore, Md.
Bennett-O'Connell Co., Chicago, Ill.
Blake & Johnson Co., Waterbury, Conn.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Osborn Mfg. Co., Cleveland, O.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Webster & Perks Tool Co., Springfield, O.

Grinding Wheels (See Foundry Supplies).

Heat Gages.
Bristol Co., Waterbury, Conn.

Hoists, Electric, Pneumatic, Hand
Rockwell Furnace Co., New York.

Hydraulic Accumulators.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Watson-Stillman Co., New York.
Wood, R. D., & Co., Philadelphia, Pa.

Hydraulic Machinery, Presses, Jacks, Etc.
Farrel Foundry & Machine Co., Ansonia, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Watson-Stillman Co., New York.
Wood, R. D., & Co., Philadelphia, Pa.

Ingot Metals (See Name of Metal Wanted).

Ingot Molds (See Molds, Ingot).

Iron, Scrap, Dealers in
Smith Co., The Morton B., New York.

Iron Tubes, Brass and Bronze Covered
Phenix Tube Co., Brooklyn, N. Y.

Japanning Ovens.
Gehnrich, Hermann, New York.
Monarch Engineering & Mfg. Co., Baltimore, Md.
Oven Equipment & Mfg. Co., New Haven, Conn.
Rockwell Furnace Co., New York.
Steiner, E. E., Newark, N. J.

Japans.
Apothecaries Hall Co., Waterbury, Conn.

Jewelers' Equipment and Supplies (See also Platers' Supplies).
Leiman Bros., New York.
No Dust Drying Machine Co., Providence, R. I.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
Tolhurst Machine Works, Troy, N. Y.

Jewelers' Findings.
Smith & Richardson, Attleboro, Mass.

Kalye.
Anthony Co., H. M., New York.

Kettles, Galvanizing and Tinning (See also Platers' Supplies).
Farrel Foundry & Machine Co., Ansonia, Conn.

Konstantia Nickel Preparation
Neubeck, Adolf, New York.

Lacquer Enamels. (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Celluloid Zapon Co., New York.
Damard Lacquer Mfg. Co., New York.
Egyptian Lacquer Mfg. Co., New York.
Eureka Pneumatic Spray Co., New York.
Munning-Loeb Co., Matawan, N. J.
Hanson & Van Winkle Co., Newark, N. J.

Lacquering Ovens.
Gehnrich, Hermann, New York.
Oven Equipment & Mfg. Co., New Haven, Conn.
Steiner, E. E., Newark, N. J.

Lacquer Sprayers.
Eclipse Air Brush & Compressor Co., Newark, N. J.
Eureka Pneumatic Spray Co., New York.

Lacquers Metal (See also Platers' Supplies).
American Lacquer Co., Bridgeport, Conn.
Barrett, M. L., & Co., Chicago, Ill.
Celluloid Zapon Co., New York.
Cooper, Chas., & Co., New York.
Damard Lacquer Mfg. Co., New York.
Egyptian Lacquer Manufacturing Co., New York.
Eureka Pneumatic Spray Co., New York.
General Bakelite Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
Kalbfleisch, Franklin H., Co., New York.
New Era Lustre Co., New Haven, Conn.
Nikolas, G. J., & Co., Chicago, Ill.

Ladle Heaters and Dryers (See also Foundry Supplies).
Monarch Eng. & Mfg. Co., Baltimore, Md.
Pangborn, Thomas W., Co., Hagerstown, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Rockwell Furnace Co., New York.

Ladles (See also Foundry Supplies).
Paxson, J. W., Co., Philadelphia, Pa.

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Lathes, Polishing (See Platers' and Polishers' Supplies).

Lathes, Spinning, Turning, Etc.
American Tool & Machine Co., Boston, Mass.
Bliss, E. W., Co., Brooklyn, N. Y.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
Pryibil, P., New York.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Lathes, Turret
American Tool & Machine Co., Boston, Mass.

Lead, Antimonial
Leavitt, C. W., & Co., New York.
Michigan Smelting & Refining Co., Detroit, Mich.
Richards & Co., Boston, Mass.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Lead Castings, Antimonial
Standard Rolling Mills Inc., Brooklyn, N. Y.

Leaden Ware and Lead Burning.
Wiarda & Co., John C., Brooklyn, N. Y.

Lead, Pig and Bar
Atkinson Co., The, Rochester, N. Y.
Birkenstein, S., & Sons, Chicago, Ill.
Chadwick-Boston Lead Co., Boston, Mass.
Fitz, Dana & Co., Boston, Mass.
Foreign & Domestic Metals Co., Cleveland, O.
Hendricks Bros., New York.
Illinois Smelting & Refining Co., Chicago, Ill.
Merchant & Evans Co., Philadelphia, Pa.
Michigan Smelting & Refining Co., Detroit, Mich.
Richards & Co., Boston, Mass.
Standard Rolling Mills Inc., Brooklyn, N. Y.
Trotter, Nathan, & Co., Philadelphia, Pa.
United Metals Selling Co., New York.
U. S. Reduction Co., Chicago, Ill.
Vogelstein, L., & Co., New York.
Walsh's Sons, M. I., & Co., Newark, N. J.

Lead Pipe.
North American Smelting Co., Philadelphia, Pa.

Leather for Polishing Wheels
Dahm & Kiefer Tanning Co., Chicago, Ill.

Leather Meal for Dry Tumbling. (See also Platers' Supplies).
Dahm & Kiefer Tanning Co., Chicago, Ill.
Hanson & Van Winkle Co., Newark, N. J.
Peckham Mfg. Co., Newark, N. J.

Lubricants.
Dixon, Joseph, Crucible Co., Jersey City, N. J.

Lycopodium (See also Foundry Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Cooper, Charles, & Co., New York.
McKesson & Robbins, New York.
Wiarda & Co., John C., Brooklyn, N. Y.

Magnesium Metal.
Cooper, Charles, & Co., New York.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.
Roessler & Hasslacher Chemical Co., New York.

Magnetic Metal Separators (See also Foundry Supplies).
Dings Electro-Mag. Separator Co., Milwaukee, Wis
Pangborn, Thomas W., Co., Hagerstown, Md.
Paxson, J. W., Co., Philadelphia, Pa.

Manganese Bronze Ingots and Castings.
Ajax Metal Co., Philadelphia, Pa.
Allan, A., & Son, New York.
American Manganese Bronze Co., New York.
Atkinson Co., The, Rochester, N. Y.
Damascus Bronze Co., Pittsburg, Pa.
Electric Smelting & Refining Co., Detroit, Mich.
Fitz, Dana & Co., Boston, Mass.
Lang, R. F., New York.
North American Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Taunton-New B'f'd Copper Co., New Bedford, Mass.

Manganese Bronze Sheets, Rods, Etc.
American Manganese Bronze Co., New York.
Bridgeport Brass Co., Bridgeport, Conn.
Taunton-New B'f'd Copper Co., New Bedford, Mass.

Manganese Copper.
Ajax Metal Co., Philadelphia, Pa.
Atkinson Co., The, Rochester, N. Y.
Electric Smelting & Alum. Co., Lockport, N. Y.
Lang, R. F., New York.
Riverside Metal Co., Riverside, N. J.
Roessler & Hasslacher Chemical Co., New York.

Manganese Metal.
Cooper, Charles, & Co., New York.
Leavitt, C. W., & Co., New York.
Roessler & Hasslacher Chemical Co., New York.

Match Plates
Middleditch, Benj., Detroit, Mich.

Metals (See name of metal wanted).

Metallurgists, Consulting.
Krom, L. J., New York.
Ledoux & Co., New York.
Thompson, Hugh L., Waterbury, Conn.

Metals, Dealers in all Kinds of New (See also name of metal wanted).
Birkenstein, S., & Sons, Chicago, Ill.
Fitz, Dana & Co., Boston, Mass.
Foreign & Domestic Metals Co., Cleveland, O.
Merchant & Evans Co., Philadelphia, Pa.
Moers, Albert A., New York.
Richards & Co., Boston, Mass.
Trotter, Nathan, & Co., Philadelphia, Pa.

Metals, Dealers in Old
Birkenstein, S., & Sons, Chicago, Ill.
Genesee Metal Co., Rochester, N. Y.
Illinois Smelting & Refining Co., Chicago, Ill.
Moers, Albert A., New York.
Radnai, Josef, New York.
Riverside Metal Co., Riverside, N. J.
Smith, The Morton B. Co., New York.
Walsh's Sons, M. I., & Co., Newark, N. J.

Metals, Dealers in Old—Gold, Silver, Platinum
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Metal Goods Drying Machines
No Dust Drying Machine Co., Providence, R. I.
Smith & Richardson, Attleboro, Mass.
Tolhurst Machine Works, Troy, N. Y.

Metal Goods Made to Order.
Aluminum Goods Mfg. Co., Manitowoc, Wis.
American Brass Co., Waterbury, Conn.
Autoyre, The, Co., Oakville, Conn.
Baird Machine Co., Bridgeport, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Crescent Brass Mfg. Co., Cleveland, O.
Flavin, W. H., & Co., New York.
Manhattan Brass Co., New York.
Pritchard Stamping Co., Rochester, N. Y.
Riverside Metal Co., Riverside, N. J.
Schroeder, Edw., Lamp Works, Jersey City, N. J.
Scovill Manufacturing Co., Waterbury, Conn.
Toledo Metal Spinning Co., Toledo, O.
Waterbury Metal Products Co., Waterbury, Conn.

Metal, Plated Sheet
Benson, H. K. & F. S., Glen Ridge, N. J.
National Sheet Metal Co., Peru, Ill.

Metal Refiners, Gold and Silver.
Ajax Metal Co., Philadelphia, Pa.
Genesee Metal Co., Rochester, N. Y.
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Metal Refiners—White Metal.
Birkenstein, S., & Sons, Chicago, Ill.
Michigan Smelting & Refining Co., Detroit, Mich.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Metal, Silver Plated Sheet
Benson, H. K. & F. S., Glen Ridge, N. J.

Metal Spinning. (See also Metal Goods made to order).
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Crescent Brass Mfg. Co., Cleveland, O.
Pritchard Stamping Co., Rochester, N. Y.
Riverside Metal Co., Riverside, N. J.
Standard Rolling Mills Inc., Brooklyn, N. Y.
Toledo Metal Spinning Co., Toledo, O.
Waterbury Metal Products Co., Waterbury, Conn.

Metal Stamping. (See also Metal Goods made to order).
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Autoyre, The, Co., Oakville, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Globe Machine & Stamping Co., Cleveland, O.
Pritchard Stamping Co., Rochester, N. Y.
Riverside Metal Co., Riverside, N. J.
Standard Rolling Mills Inc., Brooklyn, N. Y.
Toledo Metal Spinning Co., Toledo, O.
Waterbury Metal Products Co., Waterbury, Conn.

Metal Turnings, Drosses, Residue, Etc., Buyers of
Ajax Metal Co., Philadelphia, Pa.
Balbach Smelting & Refining Co., Newark, N. J.
Birkenstein, S., & Sons, Chicago, Ill.
Illinois Smelting & Refining Co., Chicago, Ill.
Radnai, Josef, New York.
Smith, The Morton B., Co., New York.
Walsh's Sons, M. I., & Co., Newark, N. J.
White & Bro., Inc., Philadelphia, Pa.

Mineral Cleaner.
Electric Smelting & Alum'n Co., Lockport, N. Y.

Mixer for Gold and Silver Sweepings.
Moussette, O. J., Co., Brooklyn, N. Y.

Mold Dryers, Portable (See also Foundry Supplies).
Monarch Eng. & Mfg. Co., Baltimore, Md.
Pangborn, Thomas W., Co., Hagerstown, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Rockwell Furnace Co., New York.

Mold Spraying Machines. (See also Foundry Supplies).
Pangborn, Thomas W., Co., Hagerstown, Md.

Molds, Ingot (See also Foundry Supplies).
Fanning, J. P., Brooklyn, N. Y.
Farrel Foundry & Machine Co., Ansonia, Conn.
Nicholls, Wm. H., New York.
Paxson, J. W., Co., Philadelphia, Pa.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Molding Machines. (See also Foundry Supplies)
Arcade Mfg. Co., Freeport, Ill.
Nicholls, Wm. H., New York.
Osborn Mfg. Co., Cleveland, O.
Paxson, J. W., Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.

Molding Sand (See Sand).

Monel Metal Sheets.
Merchant & Evans Co., Philadelphia, Pa.

Motors (See Dynamos, Etc.).

Muntz's Metal—Sheets, Rods, Bolts, Nails, Etc.
Taunton-New B'f'd Copper Co., New Bedford, Mass.

Nails (See name of metal wanted).

Name Plates, Etched
Schweizer, Max, Bridgeport, Conn.

Neubeck's Rapid Nickel Salts.
Neubeck, Adolf, New York.

Neubeck's Special Barrel Salt.
Neubeck, Adolf, New York.

Neutrol
Berkel, Wm., Chemical Co., Jersey City, N. J.

Nickel.
Fitz, Dana & Co., Boston, Mass.
Hanson & Van Winkle Co., Newark, N. J.
Hendricks Bros., New York.
Leavitt, C. W., & Co., New York.
Merchant & Evans Co., Philadelphia, Pa.
Munning-Loeb Co., Matawan, N. J.
Richards & Co., Boston, Mass.
Trotter, Nathan, & Co., Philadelphia, Pa.
Wiarda & Co., John C., Brooklyn, N. Y.

Nickel-Bronze Castings and Ingots.
Damascus Bronze Co., Pittsburg, Pa.

Nickel Castings.
Backus & Leeser Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
Munning-Loeb Co., Matawan, N. J.
Wiarda & Co., John C., Brooklyn, N. Y.

Nickel Plating (See Electroplating).

Nickel Salts (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Backus & Leeser Co., New York.
Bowers, B. O., Co., New York.
Cooper, Charles, & Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
Lang, R. F., New York.
Neubeck, Adolf, New York.
McKesson & Robbins, New York.
Moyer, D. B., Detroit, Mich.
Munning-Loeb Co., Matawan, N. J.
Stevens, Frederic B., Detroit, Mich.
United States Chemical Co., Cleveland, O.
Wiarda & Co., John C., Brooklyn, N. Y.

Nickel Sheets.
Merchant & Evans Co., Philadelphia, Pa.

Nickel, Shot
Hanson & Van Winkle Co., Newark, N. J.
Merchant & Evans Co., Philadelphia, Pa.
Seymour Manufacturing Co., The, Seymour, Conn.
Wiarda & Co., John C., Brooklyn, N. Y.

Nickel Silver Tubes.
Wells, A. H., & Co., Waterbury, Conn.

Oil Pumps and Storage Tanks.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.

Oil Separators.
American Tool & Machine Co., Boston, Mass.

Oil, Fuel.
Waverly Oil Works Co., Pittsburgh, Pa.

Oils, Tempering and Lubricating
Apothecaries Hall Co., Waterbury, Conn.
McKesson & Robbins, New York.
Swan & Finch, New York.

Ovens (See also Core, Lacquering, Enameling and Sherardizing Ovens).
Gehnrich, Hermann, New York.
Monarch Engineering & Mfg. Co., Baltimore, Md.
Oven Equipment & Mfg. Co., New Haven, Conn.
Steiner, E. E., Newark, N. J.

Parting Compounds. (See also Foundry Supplies).
Apothecaries Hall Co., Waterbury, Conn.
MacKellar's, R., Sons Co., Peekskill, N. Y.
Osborn Mfg. Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.

Pattern Shop Supplies (See Foundry Supplies)

Patterns, Wood and Metal.
Morner & Smith, Dayton, O.

Pewter.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Persels Pure Nickel Salts.
Bowers, B. O., Co., New York.

Phosphor Bronze Ingots, Castings, Etc.
Ajax Metal Co., Philadelphia, Pa.
Allan, A., & Son, New York.
Atkinson Co., The, Rochester, N. Y.
Damascus Bronze Co., Pittsburg, Pa.
Illinois Smelting & Refining Co., Chicago, Ill.
Lang, R. F., New York.
Michigan Smelting & Refining Co., Detroit, Mich.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
Riverside Metal Co., Riverside, N. J.
Seymour Mfg. Co., Seymour, Conn.

Phosphor Bronze, Cored Bars
Atkinson Co., The, Rochester, N. Y.

Phosphor Bronze Sheets, Wire, Rods, Etc.
Bridgeport Brass Co., Bridgeport, Conn.
Phosphor Bronze Smelting Co., Philadelphia, Pa.
Pilling Brass Co., Waterbury, Conn.
Riverside Metal Co., Riverside, N. J.
Seymour Mfg. Co., Seymour, Conn.

Phosphor Copper and Phosphor Tin.
Ajax Metal Co., Philadelphia, Pa.
Atkinson Co., The, Rochester, N. Y.
Damascus Bronze Co., Pittsburg, Pa.
Electric Smelt. & Aluminum Co., Lockport, N. Y.
Lang, R. F., New York.
Michigan Smelting & Refining Co., Detroit, Mich.
North American Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
Riverside Metal Co., Riverside, N. J.
Roessler & Hasslacher Chemical Co., New York.

Phosphorizers (See Crucibles, Etc.).

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Phosphorus (See also Foundry Supplies).
General Chemical Co., Philadelphia, Pa.
McKesson & Robbins, New York.

Pickling Machines, Automatic
Torrington Manufacturing Co., Torrington, Conn.

Pin Machines (See Automatic Wire and Metal Working Machines).

Plastic Bronze
Ajax Metal Co., Philadelphia, Pa.

Platers' Compound (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
International Chemical Co., Camden, N. J.
Swan & Finch Co., New York.
Wiarda & Co., John C., Brooklyn, N. Y.

Platers' Metal (See also Platers' Supplies).
Kemp, W. H., Co., New York.
Pilling Brass Co., Waterbury, Conn.

Platers', Polishers' and Galvanizers' Equipment and Supplies.
Abbott Ball Co., Hartford, Conn.
Ames Sword Co., Chicopee, Mass.
Anthony, H. M., Co., New York.
Apothecaries Hall Co., Waterbury, Conn.
Automatic Buffing Machine Co., Buffalo, N. Y.
Backus & Leeser Co., New York.
Baird Machine Co., Bridgeport, Conn.
Baltimore Tube Co., Baltimore, Md.
Barrett, M. L., & Co., Chicago, Ill.
Bennett-O'Connell Co., Chicago, Ill.
Berkel, Wm., Chemical Co., Jersey City, N. J.
Bogue, Chas. J., Electric Co., New York.
Bowers, B. O., Co., New York.
Burns, E. Reed, Brooklyn, N. Y.
Canning, W. & Co., Birmingham, England.
Cleveland Platers' Supply Co., Cleveland, O.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Cooper, Charles & Co., New York.
Flavin, W. H., & Co., New York.
Globe Machine & Stamping Co., Cleveland, O.
Grasselli Chemical Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
International Chemical Co., Camden, N. J.
Lang, R. F., New York.
Leiman Bros., New York.
L'Hommedieu, C. F., & Sons, Chicago, Ill.
Meaker Company, Chicago, Ill.
McKesson & Robbins, New York.
Moyer, D. B., Detroit, Mich.
Munning-Loeb Co., Matawan, N. J.
Neubeck, Adolf, New York.
No-Dust Drying Machine Co., Providence, R. I.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
Osborn Mfg. Co., Cleveland, O.
Peckham Mfg. Co., Newark, N. J.
Rockhill & Vietor, New York.
Roessler & Hasslacher Chemical Co., New York.
Rojas Chemical Co., New York.
Roth Bros. Co., Chicago, Ill.
Smith & Richardson, Attleboro, Mass.
Stevens, Frederic B., Detroit, Mich.
Swan & Finch Co., New York.
Tolhurst Machine Works, Troy, N. Y.
United States Chemical Co., Cleveland, O.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.
Webster & Perks Tool Co., Springfield, O.
Wiarda & Co., John C., Brooklyn, N. Y.
Williamsville Buff Mfg. Co., Danielson, Conn.
Zucker, Geo., Co., Newark, N. J.

Plating Barrels and Apparatus (See also Platers' Supplies).
Abbott Ball Co., Hartford, Conn.
Backus & Leeser Co., New York.
Baird Machine Co., Bridgeport, Conn.
Bennett-O'Connell Co., Chicago, Ill.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Globe Machine & Stamping Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
L'Hommedieu, C. F., & Sons Co., Chicago, Ill.
Moyer, D. B., Detroit, Mich.
Munning-Loeb Co., Matawan, N. J.
Rockhill & Vietor, New York.
Smith & Richardson, Attleboro, Mass.
Stevens, Frederic B., Detroit, Mich.
Tolhurst Machine Works, Troy, N. Y.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Plating Solutions.
Berkel, Wm., Chemical Co., Jersey City, N. J.
Rojas Electro Chemical Co., New York.

Platinum, Sheet and Wire.
Roessler & Hasslacher Co,, New York.

Platinum Scrap, Buyers of
Radnai, Josef, New York.
Roessler & Hasslacher Co., New York.

Plumbago (See Graphite).

Pointing Machines (See Automatic Wire and Metal Working Machinery).

Polishing, Buffing and Burnishing Machinery and Appliances (See also Platers' Supplies)
Abbott Ball Co., Hartford, Conn.
Ames Sword Co., Chicopee, Mass.
Apothecaries Hall Co., Waterbury, Conn.
Automatic Buffing Machine Co., Buffalo, N. Y.
Backus & Leeser Co., New York.
Baird Machine Co., Bridgeport, Conn.
Baltimore Tube Co., Baltimore, Md.
Bennett-O'Connell Co., Chicago, Ill.
Cleveland Blow Pipe Co., Cleveland, O.
Cleveland Platers' Supply Co., Cleveland, O.
Connecticut Dynamo & Motor Co., Irvington, N. J.
Flavin, W. H., & Co., New York.
Globe Machine & Stamping Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
Kirk & Blum, Cincinnati, O.
Knickerbocker Co., Jackson, Mich.
Leiman Bros., New York.
L'Hommedieu, C. F., & Sons, Chicago, Ill.
Middleditch, Benj., Detroit, Mich.
Munning-Loeb Co., Matawan, N. J.
No-Dust Drying Machine Co., Providence, R. I.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
Osborn Mfg. Co., Cleveland, O.
Peckham Mfg. Co., Newark, N. J.
Pfleghar Hardware Sp'lty Co., New Haven, Conn.
Roth Bros., Chicago, Ill.
Stevens, Frederic B., Detroit, Mich.
Tolhurst Machine Works, Troy, N. Y.
United States Chemical Co., Cleveland, O.
Webster & Perks Tool Co., Springfield, O.
Williamsville Buff Mfg. Co., Danielson, Conn.

Polishing (See Electroplating, Polishing, Etc.).

Polishing Belts, Endless (See also Platers' Supplies).
Ames Sword Co., Chicopee, Mass.

Polishing Meal for Dry Tumbling
Peckham Mfg. Co., Newark, N. J.

Polishing Wheels, Leather for
Dahm & Kiefer Tanning Co., Chicago, Ill.

Potash (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Cooper, Charles, & Co., New York.
Grasselli Chemical Co., New York.
International Chemical Co., Camden, N. J.
McKesson & Robbins, New York.
Niagara Alkali Co., Niagara Falls, N. Y.
Wiarda & Co., John C., Brooklyn, N. Y.

Potassium Silver Cyanide.
Berkel, Wm., Chemical Co., Jersey City, N. J.

Presses, Bench and Foot
Baird Machine Co., Bridgeport, Conn.
Blake & Johnson Co., Waterbury, Conn.
Bliss, E. W., Company, Brooklyn, N. Y.
Leiman Bros., New York.
Shuster, The F. B., Co., New Haven, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Presses, Cabbaging
Farrel Foundry & Machine Co., Ansonia, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Wood, R. D., & Co., Philadelphia, Pa.

Presses, Coining
Bliss, E. W., Co., Brooklyn, N. Y.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Presses, Drop
Bliss, E. W., Co., Brooklyn, N. Y.
Oliver, W. W., Mfg. Co., Buffalo, N. Y.
Peck Drop Press Works, New Haven, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Presses, Drop Lifters for
Peck Drop Press Works, New Haven, Conn.

Presses, Filler.
American Tool & Machine Co., Boston, Mass.

Presses, Power.
Baird Machine Co., Bridgeport, Conn.
Blake & Johnson Co., Waterbury, Conn.
Bliss, E. W., Co., Brooklyn, N. Y.
Farrel Foundry & Machine Co., Ansonia, Conn.
Garrison, A., Foundry Co., Pittsburg, Pa.
Peck Drop Press Works, New Haven, Conn.
Torrington Manufacturing Co. Torrington, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Watson-Stillman Co., New York.
Wood, R. D., & Co., Philadelphia, Pa.

Pressure Blowers (See also Foundry Supplies).
Eclipse Air Brake & Compressor Co., Newark, N. J.
Eureka Pneumatic Spray Co., New York.
Leiman Bros., New York.
Monarch Eng. & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.

Prometheus Nickel Salts.
Neubeck, Adolf, New York.

Pumice (See Platers', Polishers' and Galvanizers' Supplies).

Pyrometers.
Bristol & Co., The, Waterbury, Conn.

Recording Instruments.
Bristol, The, Co., Waterbury, Conn.

Riddles (See also Foundry Supplies).
Stevens, Frederic B., Detroit, Mich.

Rifled Tubing.
Baltimore Tube Co., Baltimore, Md.

Riveting Machines.
Shuster, The F. B., Co., New Haven, Conn.
Wood, R. D., & Co., Philadelphia, Pa.

Rivets—Brass, Aluminum, Etc.
Hassall, John, Inc., New York.
Hendricks Bros., New York.
Kemp, W. H., Co., New York.

Rojas Process of Electro Deposition.
Rojas Electro Chemical Co., New York.

Roll-Grinding Machines.
Farrel Foundry & Machine Co., Ansonia, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Rolls, Chilled and Sand.
Blake & Johnson Co., Waterbury, Conn.
Farrel Foundry & Machine Co., Ansonia, Conn.
Garrison, A., Fdy. & Machine Co., Pittsburg, Pa.
Torrington Manufacturing Co., Torrington, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Rolls, Jewelers'
Leiman Bros., New York.
Oliver, W. W., Mfg. Co., The, Buffalo, N. Y.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Rolling Mill Machinery.
Blake & Johnson Co., Waterbury, Conn.
Farrel Foundry & Machine Co., Ansonia, Conn.
Garrison, A., Fdy. & Machine Co., Pittsburg, Pa.
Torrington Manufacturing Co., Torrington, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Rouge (See also Platers' Supplies).
Zucker, Geo., Co., Newark, N. J.

Rust-Proofing Process (See also Galvanizing).
Flavell, E. A., New Britain, Conn.
Schneider, Wm., New York.

Salt Water Gold Plating Outfits.
Schneider, Wm., New York.

Sand, Fire (See also Foundry Supplies).
Pangborn, Thomas W., Co., Jersey City, N. J.
Paxson, J. W., Co., Philadelphia, Pa.

Sand Blast Machinery and Equipment.
Leiman Bros., New York.
Nicholls, Wm. H., New York.
Pangborn, Thomas W., Co., Jersey City, N. J.
Paxson, J. W., Co., Philadelphia, Pa.
Sly, W. W., Mfg. Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.

Sand Blast Systems.
Pangborn, Thomas W., Co., Jersey City, N. J.
Paxson, J. W., Co., Philadelphia, Pa.

Sand Blast Tumbling Barrels.
Pangborn, Thomas W., Co., Jersey City, N. J.
Paxson, J. W., Co., Philadelphia, Pa.
Sly, W. W., Mfg. Co., Cleveland, O.

Sand Handling and Conveying Machines.
Pangborn, Thomas W., Co., Jersey City, N. J.

Sand Dryers, Sifters and Mixers.
(See also Foundry Supplies).
Arcade Mfg. Co., Freeport, Ill.
Nicholls, Wm. H., New York.
Osborn Mfg. Co., Cleveland, O.
Pangborn, Thomas W., Co., Jersey City, N. J.
Paxson, J. W., Co., Philadelphia, Pa.

Sand, Molding (See also Foundry Supplies).
Pangborn, Thomas W., Co., Jersey City, N. J.
Paxson, J. W., Co., Philadelphia, Pa.

Sawdust, Boxwood, for Drying Purposes.
(See also Platers' Supplies).
Hanson & Van Winkle Co., Newark, N. J.
Lignum Chemical Works, Brooklyn, N. Y.
Sommers, John, Faucet Co., Newark, N. J.

Sawdust Drying-out Boxes.
(See also Platers' Supplies).
Bennett-O'Connell Co., Chicago, Ill.
Hanson & Van Winkle Co., Newark, N. J.
Munning-Loeb Co., Matawan, N. J.
No-Dust Drying Machine Co., Providence, R. I.
Smith & Richardson, Attleboro, Mass.
Steiner, E. E., Newark, N. J.

Sawdust, Rock Maple, Graded.
Lignum Chemical Works, Brooklyn, N. Y.

Scrap Metal (See Metal Turnings, Drosses, Residues, Etc.).

Screw Machine Work.
Schroeder, Edw., Lamp Works, Jersey City, N. J.
Toledo Metal Spinning Co., Toledo, O.

Shears, Power.
Bliss, E. W., Co., Brooklyn, N. Y.
Farrel Foundry & Machine Co., Ansonia, Conn.
Garrison, A., Fdy. & Machine Co., Pittsburg, Pa.
Torrington Manufacturing Co., Torrington, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.
Watson-Stillman Co., New York.
Wood, R. D., & Co., Philadelphia, Pa.

Sheepskins for Buffing Wheels.
Dahm & Kiefer Tanning Co., Chicago, Ill.

Sheet Metal Novelties.
Autoyre, The, Co., Oakville, Conn.
Pritchard Stamping Co., Rochester, N. Y.

Sheet Metal Parts.
Autoyre, The, Co., Oakville, Conn.
Pritchard Stamping Co., Rochester, N. Y.

Sheet Metal Straightening, Cutting and Forming Machinery.
Baird Machine Co., Bridgeport, Conn.
Bliss, E. W., Co., Brooklyn, N. Y.
Blake & Johnson Co., Waterbury, Conn.
Farrel Foundry & Machine Co., Ansonia, Conn.
Shuster, The F. B., Co., New Haven, Conn.
Torrington Manufacturing Co., Torrington, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Sherardizing (See also Galvanizing).
Globe Machine & Stamping Co., Cleveland, O.

Sherardizing Ovens.
Gebnrich, Hermann, New York.
Globe Machine & Stamping Co., Cleveland, O.
Monarch Engineering & Mfg. Co., Baltimore, Md.
Rockwell Furnace Co., New York.

Shop Furniture, Etc.
Ohio Mfg. Co., Painesville, O.
Sly, W. W., Mfg. Co., Cleveland, O.

Silicon.
Leavitt, C. W., & Co., New York.

Silicon Copper.
Ajax Metal Co., Philadelphia, Pa.
Damascus Bronze Co., Pittsburg, Pa.
Electric Smelting & Alum'm Co., Lockport, N. Y.
Lang, R. F., New York.
Roessler & Hasslacher Chemical Co., New York.

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Silver and Gold, Granulated.
Jackson, John J., & Co., Newark, N. J.

Silver Cyanide.
Berkel, Wm., Chemical Co., Jersey City, N. J.

Silver, Nitrate and Chloride of
(See also Platers' Supplies).
Jackson, John J., Co., Newark, N. J.

Silver Ingots, Bars, Plates, Etc.
Renziehausen, Wm. F., Co., Newark, N. J.

Silver Refiners.
Jackson, John J., Newark, N. J.
Renziehausen, Wm. F., Co., Newark, N. J.

Silver, Rolled Sterling.
Jackson, John J., Co., Newark, N. J.
Renziehausen, Wm. F., Co., Newark, N. J.
Riverside Metal Co., Riverside, N. J.

Silver Solder.
Jackson, John J., Co., Newark, N. J.

Silver Wire.
Jackson, John J., Co., Newark, N. J.

Smelters of Copper-Bearing Materials.
Ajax Metal Co., Philadelphia, Pa.
Baibach Smelting & Refining Co., Newark, N. J.

Smelters, Sweep.
Renziehausen, Wm. F., Co., Newark, N. J.

Soap (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
International Chemical Co., Camden, N. J.

Solder, Aluminum.
Aluminum Company of America, Pittsburg, Pa.
Aluminum Solder Co., Boston, Mass.
Atkinson Co., The, Rochester, N. Y.
Electric Smelt. & Aluminum Co., Lockport, N. Y.
Janney, Steinmetz & Co., Philadelphia, Pa.
Kemp, W. H., Co., New York.
Richards & Co., Boston, Mass.
U. S. Reduction Co., Chicago, Ill.

Solder, Brazing.
Ajax Metal Co., Philadelphia, Pa.
Fitz, Dana & Co., Boston, Mass.
Hussey, C. G., & Co., Pittsburg, Pa.
Merchant & Evans Co., Philadelphia, Pa.
North American Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.

Solder, Hard, for Cast Iron
Lang, R. F., New York.

Soldering Flux.
Grasselli Chemical Co., Cleveland, O.
Richards & Co., Boston, Mass.

Soldering Irons
Hendricks Bros., New York.
Hussey, C. G., & Co., Pittsburg, Pa.
Taunton-New B'f'd Copper Co., New Bedford, Mass.

Soldering Irons, Self-Heating.
Kaufman, A. G., Mfg. Co., New York.

Solder, Silver
Jackson, John J., & Co., Newark, N. J.

Solder, Tinners'
Atkinson Co., The, Rochester, N. Y.
Columbia Smelting & Refining Works, New York.
Fitz, Dana & Co., Boston, Mass.
Merchant & Evans Co., Philadelphia, Pa.
Michigan Smelting & Refining Co., Detroit, Mich.
North American Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.

Soluble Cotton
Barrett, M. L., & Co., Chicago, Ill.
Wiarda & Co., John C., Brooklyn, N. Y.

Spelter.
Birkenstein, S., & Sons, Chicago, Ill.
Damascus Bronze Co., Pittsburg, Pa.
Fitz, Dana & Co., Boston, Mass.
Foreign & Domestic Metals Co., Cleveland, O.
Genessee Metal Co., Rochester, N. Y.
Grasselli Chemical Co., Cleveland, O.
Hegeler Bros., Danville, Ill.
Hendricks Bros., New York.
Illinois Smelting & Refining Co., Chicago, Ill.
Illinois Zinc Co., Peru, Ill.
Leavitt, C. W., & Co., New York.
Matthiesen & Hegeler Zinc Co., La Salle, Ill.
Michigan Smelting & Refining Co., Detroit, Mich.
New Jersey Zinc Co., The, New York.
Richards & Co., Boston, Mass.
Sandoval Zinc Co., Chicago, Ill.
Trotter, Nathan, & Co., Philadelphia, Pa.
Vogelstein, L., & Co., New York.
U. S. Reduction Co., Chicago, Ill.
Walsh's Sons, M. I., & Co., Newark, N. J.

Spelter Kettles (See Crucibles, Etc.).

Spinning Lathes.
Bliss, E. W., Company, Brooklyn, N. Y.
Pryibil, P., New York.

Spinning, Metal
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Crescent Brass Mfg. Co., Cleveland, O.
Riverside Metal Co., Riverside, N. J.
Toledo Metal Spinning Co., Toledo, O.
Standard Rolling Mills Inc., Brooklyn, N. Y.
Waterbury Metal Products Co., Waterbury, Conn.

Spraying Machines.
Eclipse Air Brush & Compressor Co., Newark, N. J.
Eureka Pneumatic Spray Co., New York.
Pangborn, Thomas W., Co., Hagerstown, Md.

Sprue Cutters (See also Foundry Supplies).
Bliss, E. W., Co., Brooklyn, N. Y.
Middleditch, Benj., Detroit, Mich.
Nicholls, Wm. H., New York.
Shuster, The F. B., Company, New Haven, Conn.
Smith, J. D., Foundry Supply Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Stampings, Metal.
Aluminum Goods Mfg. Co., Manitowoc, Wis.
Globe Machine & Stamping Co., Cleveland, O.
Pritchard Stamping Co., Rochester, N. Y.
Riverside Metal Co., Riverside, N. J.
Standard Rolling Mills Inc., Brooklyn, N. Y.
Toledo Metal Spinning Co., Toledo, O.
Waterbury Metal Products Co., Waterbury, Conn.

Stearic Acid and Stearine.
Rockhill & Vietor, New York.

Steel Snap Fittings and Furniture.
Sly, W. W., Mfg. Co., Cleveland, O.
Ohio Mfg. Co., Painesville, O.

Steel Tubing, Thin Gauges.
Baltimore Tube Co., Baltimore, Md.

Sterling Silver Sheets.
Jackson, John J., Newark, N. J.

Stirrers, Graphite (See Crucibles, Etc.).

Sweep Smelters Mixing Machine.
Moussette, O. J., Co., Brooklyn, N. Y.

Sweep Smelters (See Smelters, Sweep).

Tacks (See name of metal wanted).

Tanks, Electroplaters' (See also Platers Supplies).
Backus & Leeser Co., New York.
Chadwick-Boston Lead Co., Boston, Mass.
Corcoran, A. J., Inc., New York.
Hanson & Van Winkle Co., Newark, N. J.
Munning-Loeb Co., Matawan, N. J.
Stearns, The A. T., Lumber Co., Boston, Mass.
Wiarda & Co., John C., Brooklyn, N. Y.

Testing Laboratories.
Ledoux & Co., New York.
Thompson, Hugh L., Waterbury, Conn.

Tin, Chloride of
Grasselli Chemical Co., Cleveland, O.
Wiarda & Co., John C., Brooklyn, N. Y.

Tinning Machines
Globe Machine & Stamping Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
Meaker Co., The, Chicago, Ill.
U. S. Electro Galvanizing Co., Brooklyn, N. Y.

Tin, Pig, Bar and Block.
Birkenstein, S., & Sons, Chicago, Ill.
Fitz, Dana & Co., Boston, Mass.
Foreign & Domestic Metals Co., Cleveland, O.
Hendricks Bros., New York.
Leavitt, C. W., & Co., New York.
Merchant & Evans Co., Boston, Mass.
Michigan Smelting & Refining Co., Detroit, Mich.
Richards & Co., Boston, Mass.
Standard Rolling Mills Inc., Brooklyn, N. Y.
Trotter, Nathan, & Co., Philadelphia, Pa.
Vogelstein, L., & Co., New York.
U. S. Reduction Co., Chicago, Ill.

Tin, Sheet Block.
Merchant & Evans Co., Philadelphia, Pa.
Standard Rolling Mills, Inc., Brooklyn, N. Y.

Tobin Bronze.
American Brass Co., Waterbury, Conn.

Tramrails (See also Foundry Supplies).
Rockwell Furnace Co., New York.

Tripoli Flour, Stone, Filters, Etc. (See also Platers' Supplies).
Apothecaries Hall Co., Waterbury, Conn.
Cooper, Charles, & Co., New York.
McKesson & Robbins, New York.
Stevens, Frederic B., Detroit, Mich.
Wiarda & Co., John C., Brooklyn, N. Y.
Zucker, Geo., Co., Newark, N. J.

Trisalyt Triple salt.
Roessler & Hasslacher Chemical Co., New York.

Trolley Systems.
Nicholls, Wm. H., New York.
Rockwell Furnace Co., New York.

Tumbling Barrels, Leather for Dry
Peckham Mfg. Co., Newark, N. J.

Tube Bending Machines.
Baltimore Tube Co., Baltimore, Md.

Tube Machinery.
Farrel Foundry & Machine Co., Ansonia, Conn.
Torrington Mfg. Co., Torrington, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Tube Polishing Machines.
Baltimore Tube Co., Baltimore, Md.

Tubes (See name of metal wanted).

Tumbling Barrels (See also Foundry Supplies and Platers' Supplies).
Abbott Ball Co., Hartford, Conn.
Baird Machine Co., Bridgeport, Conn.
Globe Machine & Stamping Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
Middleditch, Benj., Detroit, Mich.
Nicholls, Wm. H., New York.
Osborn Mfg. Co., Cleveland, O.
Pangborn, Thomas W., Co., Hagerstown, Md.
Paxson, J. W., Co., Philadelphia, Pa.
Sly, W. W., Mfg. Co., Cleveland, O.
Stevens, Frederic B., Detroit, Mich.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Type Metal.
Ajax Metal Co., Philadelphia, Pa.
Columbia Smelting & Refining Works, New York.
Illinois Smelting & Refining Co., Chicago, Ill.
North American Smelting Co., Philadelphia, Pa.
Richards & Co., Boston, Mass.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Vibrators (See also Foundry Supplies).
Nicholls, Wm. H., New York.

Vienna Lime (See also Platers', Polishers' and Galvanizers' Supplies).
Zucker, Geo., Co., Newark, N. J.

Voltmeters (See also Platers', Polishers and Galvanizers' Supplies).
Bristol Co., The, Waterbury, Conn.
Hanson & Van Winkle Co., Newark, N. J.
Sangamo Electric Co., Springfield, Ill.
United States Chemical Co., Cleveland, O.

Vulcan Nickel Plating Preparation
Neubeck, Adolf, New York.

Waldberg's Nickel Salts.
Bowers, B. O., Co., New York.

Waste Washing Machines.
American Tool & Machine Co., Boston, Mass.

Wattmeters.
Bristol, The, Co., Waterbury, Conn.

Wax Wire (See also Foundry Supplies).
Stevens, Frederic B., Detroit, Mich.

Whale Oil Soap.
Apothecaries Hall Co., Waterbury, Conn.
Hanson & Van Winkle Co., Newark, N. J.
International Chemical Co., Camden, N. J.
Swan & Finch Co., New York.

White Finish.
Zucker, Geo., Co., Newark, N. J.

White Metal Ingots and Castings.
Ajax Metal Co., Philadelphia, Pa.
Standard Rolling Mills Inc., Brooklyn, N. Y.

White Metal Rolling for the Trade.
Standard Rolling Mills Inc., Brooklyn, N. Y.

Wire (See name of metal wanted).

Wire Coilers.
Baird Machine Co., Bridgeport, Conn.

Wire Forms.
Autoyre, The, Co., Oakville, Conn.
Pritchard Stamping Co., Rochester, N. Y.

Wire Goods Manufacturers. (See also Metal Goods Made to Order).
Autoyre, The, Co., Oakville, Conn.
Baird Machine Co., Bridgeport, Conn.
Campbell-Warner Co., Middletown, Conn.
Pritchard Stamping Co., Rochester, N. Y.

Wire Mill Equipment.
Blake & Johnson Co., Waterbury, Conn.
Farrel Foundry & Machine Co., Ansonia, Conn.
Torrington Mfg. Co., Torrington, Conn.
Waterbury (Conn.) Farrel Foundry & Machine Co.

Wire Nails, All Metals.
Hassall, John, Inc., New York.

Wire Specialties and Novelties.
Autoyre, The, Co., Oakville, Conn.
Pritchard Stamping Co., Rochester, N. Y.

Wire Straightening and Forming Machinery.
Baird Machine Co., Bridgeport, Conn.
Blake & Johnson Co., Waterbury, Conn.
Bliss, E. W., Co., Brooklyn, N. Y.
Shuster, The F. B., Co., New Haven, Conn.

Wire Wheel and Hand Brushes (See also Foundry Supplies).
Blumenthal, Hermann, & Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
Osborn Mfg. Co., Cleveland, O.
Paxson, J. W., Co., Philadelphia, Pa.
Stevens, Frederic B., Detroit, Mich.

Zinc Battery Plates.
Grasselli Chemical Co., Cleveland, O.
Matthieson & Hegeler Zinc Co., La Salle, Ill.

Zinc, Chloride of (See also Platers' Supplies).
Cooper, Charles, & Co., New York.
Grasselli Chemical Co., Cleveland, O.
Hanson & Van Winkle Co., Newark, N. J.
Richards & Co., Boston, Mass.
Sandoval Zinc Co., East St. Louis, Ill.
Wiarda & Co., John C., Brooklyn, N. Y.

Zinc Dust (See also Platers' Supplies).
Cooper, Charles, & Co., New York.
Globe Machine & Stamping Co., Cleveland, O.
Grasselli Chemical Co., Cleveland, O.
Leavitt, C. W., & Co., New York.
McKesson & Robbins, New York.
Wiarda & Co., John C., Brooklyn, N. Y.

Zinc Salts, Commercial (See also Platers' Supplies).
Cooper, Charles, & Co., New York.
Hanson & Van Winkle Co., Newark, N. J.
Sandoval Zinc Co., East St. Louis, Ill.
Wiarda & Co., John C., Brooklyn, N. Y.

Zinc Sheet and Plate.
Illinois Zinc Co., Peru, Ill.
Matthiesen & Hegeler Zinc Co., La Salle, Ill.
Merchant & Evans Co., Philadelphia, Pa.
National Sheet Metal Co., Peru, Ill.
Pilling Brass Co., Waterbury, Conn.
Richards & Co., Boston, Mass.

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